

# Deploying a Java applications using Maven and Tomcat

## 1. Maven:

- **Build Automation Tool:** Maven is a build automation tool primarily used for Java projects to manage dependencies, build lifecycle, and project management.
- **Project Object Model (POM):** Maven uses a POM XML file to define project configurations, dependencies, plugins, and build profiles.
- **Dependency Management:** Maven simplifies dependency management by resolving and downloading dependencies from repositories like Maven Central.
- **Consistency:** Promotes a standardized project structure and build process across different projects, enhancing consistency and collaboration.
- **Plugins:** Extensible with plugins for various tasks such as compiling code, running tests, packaging applications, and deploying artifacts.

## 2. Tomcat:

- **Web Server and Servlet Container:** Apache Tomcat is an open-source web server and servlet container used for deploying Java web applications.
- **Java Servlets and JSP:** Supports Java Servlets, Java Server Pages (JSP), and WebSocket-based applications.
- **HTTP Server:** Acts as a standalone HTTP server capable of serving static content and dynamic Java-based web applications.
- **Integration:** Used with frameworks like Spring and Hibernate for enterprise-level web applications.
- **Configuration:** Configured through XML and properties files to customize server behaviour, manage resources, and security settings.

## 3. Uses:

- **Together:** Maven is often used to manage dependencies and build WAR files for deploying Java web applications to Tomcat.
- **Development:** Tomcat provides a lightweight environment for testing and deploying web applications during development.
- **Deployment:** Maven simplifies packaging applications with dependencies into deployable WAR files, which can then be easily deployed to Tomcat servers.
- **Scalability:** Both tools support scalable deployment of web applications, making them suitable for small to large-scale projects.

These tools are essential in Java development for their roles in managing dependencies, building applications, and deploying web services efficiently.

This documentation outlines the deployment process for Java applications using Maven as the build automation tool and Tomcat as the servlet container. The applications covered in this project include:

- Pet Clinic
- Train Ticket Reservation
- Taxi Booking

Launch an instance. Give name. select AMI as ubuntu.

The screenshot shows the AWS CloudShell interface with the URL <https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances>. The 'Launch an instance' page is displayed, showing the following configuration:

- Name and tags:** Name is set to "manual-deployment".
- Application and OS Images (Amazon Machine Image):** The Canonical, Ubuntu, 24.04 LTS AMI is selected.
- Virtual server type (instance type):** t2.micro.
- Firewall (security group):** New security group.
- Storage (volumes):** 1 volume(s) - 8 GiB.

A tooltip for the "Free tier" information is visible, stating: "Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is available)." The "Launch instance" button is highlighted in orange.

The screenshot shows the AWS CloudShell interface with the URL <https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances>. The 'Launch an instance' page is displayed, showing the following configuration:

- Application and OS Images (Amazon Machine Image):** The Canonical, Ubuntu, 24.04 LTS AMI is selected.
- Virtual server type (instance type):** t2.medium.
- Firewall (security group):** New security group.
- Storage (volumes):** 1 volume(s) - 8 GiB.

A tooltip for the "Free tier" information is visible, stating: "Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is available)." The "Launch instance" button is highlighted in orange.

## Create a key pair and choose instance type.

**Create key pair**

**Key pair name:** tomcat-deployment

**Key pair type:** RSA (selected)

**Private key file format:** .pem (selected)

**Network settings:** vpc-0ef979d7194b289ff

**Launch instance**

**Summary**

**Number of instances:** 1

**Software Image (AMI):** Canonical, Ubuntu, 24.04 LTS, ... read more

**Virtual server type (instance type):** t2.medium

**Firewall (security group):** New security group

**Storage (volumes):** 1 volume(s) - 8 GiB

**Free tier:** In your first year includes 750 hours of t2.micro or t3.micro in the Regions in which t2.micro is

**Launch instance**

**Inbound Security Group Rules**

**Security group rule 1 (TCP, 22, 0.0.0.0/0)**

Type	Protocol	Port range	Description
ssh	TCP	22	e.g. SSH for admin desktop
Source type	Source		Add CIDR, prefix list or security
Anywhere			0.0.0.0/0

**Security group rule 2 (TCP, 8080, 0.0.0.0/0)**

Type	Protocol	Port range	Description
Custom TCP	TCP	8080	e.g. SSH for admin desktop
Source type	Source		Add CIDR, prefix list or security
Custom			0.0.0.0/0

**Summary**

**Number of instances:** 1

**Software Image (AMI):** Canonical, Ubuntu, 24.04 LTS, ... read more

**Virtual server type (instance type):** t2.medium

**Firewall (security group):** New security group

**Storage (volumes):** 1 volume(s) - 8 GiB

**Free tier:** In your first year includes 750 hours of t2.micro or t3.micro in the Regions in which t2.micro is

**Launch instance**

## Click on instance id. Click on connect. Click on connect.

**Instance summary for i-054fc0d3fe7cd81e5 (manual-deployment)**

- Public IPv4 address: 18.234.107.199
- Instance state: Running
- Private IP DNS name (IPv4 only): ip-172-31-55-255.ec2.internal
- Instance type: t2.medium
- VPC ID: vpc-0ef979d7194b2891f
- Subnet ID: subnet-00eca561430eb23dk
- Instance ARN: arn:aws:ec2:us-east-1:891377277875:instance/i-054fc0d3fe7cd81e5

**Connect to instance**

Connect to your instance i-054fc0d3fe7cd81e5 (manual-deployment) using any of these options

- EC2 Instance Connect** (selected)
- Session Manager**
- SSH client**
- EC2 serial console**

**Connection Type:**

- Connect using EC2 Instance Connect**: Connect using the EC2 Instance Connect browser-based client, with a public IPv4 address.
- Connect using EC2 Instance Connect Endpoint**: Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.

**Public IP address:** 18.234.107.199

**Username:** ubuntu

**Note:** In most cases, the default username, ubuntu, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

```

Memory usage: 5%
IPv4 address for enx0: 172.31.55.255
Sswap usage: 0%
Expanded Security Maintenance for Applications is not enabled.
0 updates can be applied immediately.
Kenable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-55-255:~$ sudo -i
root@ip-172-31-55-255:~# apt update -y

```

**i-054fc0d3fe7cd81e5 (manual-deployment)**

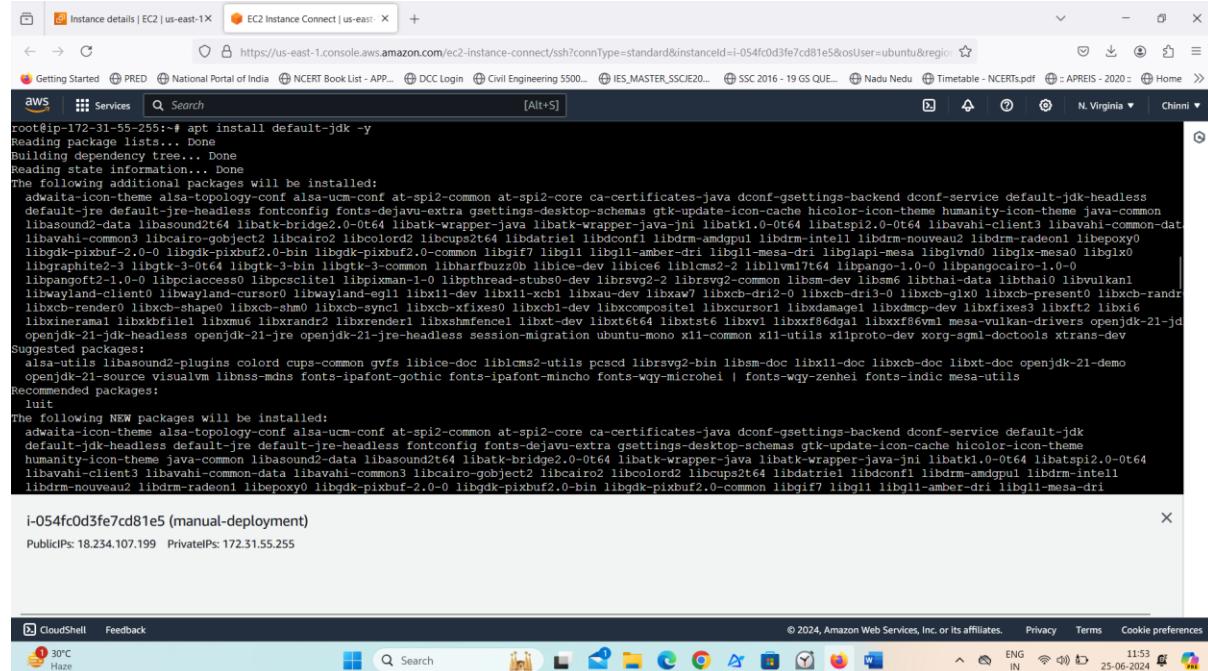
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255



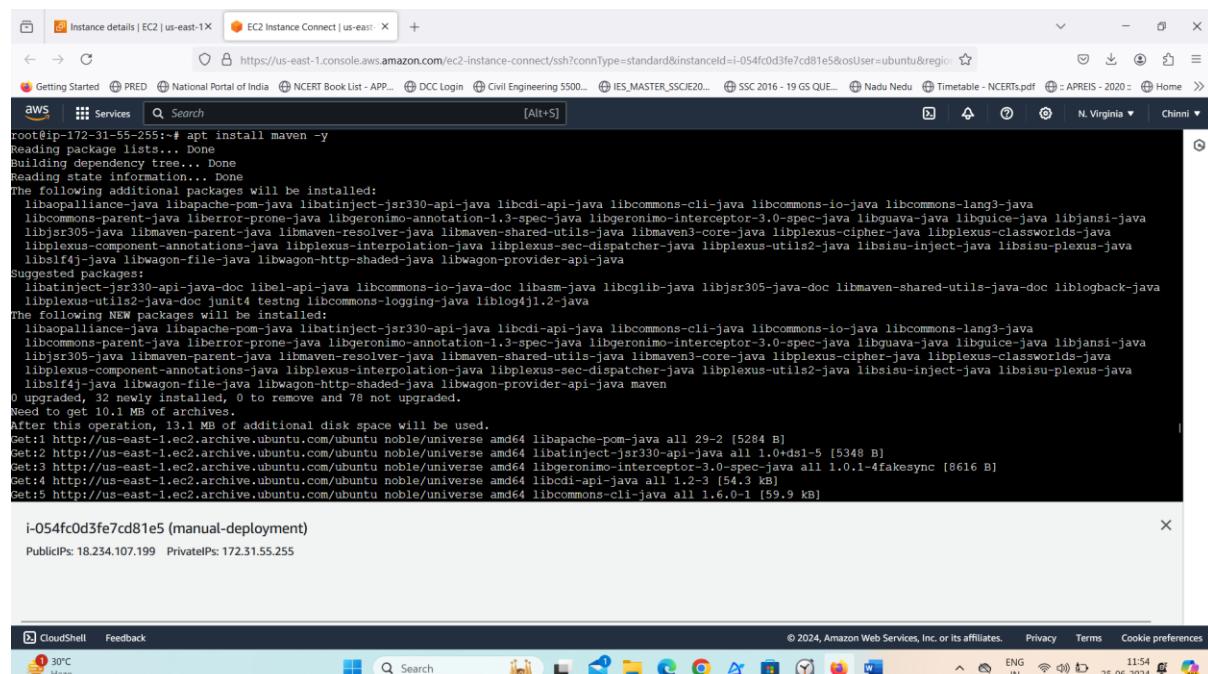
Convert normal user to root user using the command sudo -i.

Update the server using apt update -y.

Install java and maven (apt install default-jdk -y && apt install maven -y)



```
root@ip-172-31-55-255:~# apt install default-jdk -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  adwaita-icon-theme alsa-topology-conf alsu-ucm-conf at-spi2-core ca-certificates-java dconf-gsettings-backend dconf-service default-jdk-headless
  default-jre default-jre-headless fontconfig fonts-dejavu-extra gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-theme java-common
  libasound2-data libasound2t64 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0t64 libatspi2.0-0t64 libavahi-client3 libavahi-common-data
  libavahi-common3 libcairo-gobject2 libcairo2 libcairo2 libcupsc2t64 libdatriel libdrm-amdgpu libdrm-intel libdrm-nouveau2 libdrm-radeon1 libepoxy0
  libgdk-pixbuf2.0-0 libgdk-pixbuf2.0-0-common libgif7 libglib1 libglib1-amber-dri libglib1-mesa-dri libglib1-mesa libglibvnd0 libglx-mesa0 libglx0
  libgraphite2-3 libgtk-3-0t64 libgtk-3-common libharfbuzz0b libice-dev libice6 libicme2-2 libilmm1t64 libpango-1.0-0 libpangocaliro-1.0-0
  libpangoft2-1.0-0 libpcaccess0 libpcscclite1 libpixman-1-0 libpthread-stubs0-dev librsvg2-2 librsvg2-common libsmi-libthai-data libthai0 libvulkani
  libwayland-client0 libwayland-cursor0 libwayland-egl libx11-dev libx11-xcb1 libxau-dev libxaw7 libxcb-dr1-0 libxcb-dr3-0 libxcb-glx0 libxcb-present0 libxcb-render0
  libxcb-renderer0 libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xfixes0 libxcb1-dev libxcomposite1 libxcursor1 libxdamage1 libxdmcp-dev libxfixes3 libxt2 libx16
  libxinerama1 libxxf86os0 libxrandr2 libxrender1 libxshmfence1 libxt-dev libxt6t64 libxtst6 libxv1 libxf86dg1 libxf86vm1 mesa-vulkan-drivers openjdk-21-jdk
  openjdk-21-jdk-headless openjdk-21-jre openjdk-21-jre-headless session-migration ubuntu-mono x11-common x11-utils xproto-dev xorg-sgml-doctools xtrans-dev
Suggested packages:
  alsu-utils libasound2-plugins colord cups-common gvfs libice-doc libicms2-0t64 pcsd librsvg2-bin libsmi-doc libx11-doc libxcb-doc libxt-doc openjdk-21-demo
  openjdk-21-source visualvm libns-mcs fonts-ipafont-gothic fonts-ipafont-mincho fonts-wqy-microhei1 fonts-wqy-zhenhei fonts-indic mesa-utils
Recommended packages:
  luit
The following NEW packages will be installed:
  adwaita-icon-theme alsa-ucm-conf at-spi2-core ca-certificates-java dconf-gsettings-backend dconf-service default-jdk
  default-jdk-headless default-jre default-jre-headless fontconfig fonts-dejavu-extra gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-theme
  humanity-icon-theme java-common libasound2-data libasound2t64 libatk-bridge2.0-0t64 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0t64 libatspi2.0-0t64
  libavahi-client3 libavahi-common3 libcairo-gobject2 libcairo2 libcupsc2t64 libdatriel libdrm-amdgpu libdrm-intel libdrm-nouveau2 libdrm-radeon1 libepoxy0
  libgdk-pixbuf2.0-0 libgdk-pixbuf2.0-0-common libgif7 libglib1 libglib1-amber-dri libglib1-mesa-dri libglib1-mesa libglibvnd0 libglx-mesa0 libglx0
  libgraphite2-3 libgtk-3-0t64 libgtk-3-common libharfbuzz0b libice-dev libice6 libicme2-2 libilmm1t64 libpango-1.0-0 libpangocaliro-1.0-0
  libpangoft2-1.0-0 libpcaccess0 libpcscclite1 libpixman-1-0 libpthread-stubs0-dev librsvg2-2 librsvg2-common libsmi-libthai-data libthai0 libvulkani
  libwayland-client0 libwayland-cursor0 libwayland-egl libx11-dev libx11-xcb1 libxau-dev libxaw7 libxcb-dr1-0 libxcb-dr3-0 libxcb-glx0 libxcb-present0 libxcb-render0
  libxcb-renderer0 libxcb-shape0 libxcb-shm0 libxcb-sync1 libxcb-xfixes0 libxcb1-dev libxcomposite1 libxcursor1 libxdamage1 libxdmcp-dev libxfixes3 libxt2 libx16
  libxinerama1 libxxf86os0 libxrandr2 libxrender1 libxshmfence1 libxt-dev libxt6t64 libxtst6 libxv1 libxf86dg1 libxf86vm1 mesa-vulkan-drivers openjdk-21-jdk
  openjdk-21-jdk-headless openjdk-21-jre openjdk-21-jre-headless session-migration ubuntu-mono x11-common x11-utils xproto-dev xorg-sgml-doctools xtrans-dev
i-054fc0d3fe7cd81e5 (manual-deployment)
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255
```



```
root@ip-172-31-55-255:~# apt install maven -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libbaopalliance-java libapache-pom-jar libatinject-jsr330-api-jar libcdi-api-jar libcommons-cli-jar libcommons-io-jar libcommons-lang3-jar
  libcommons-parent-jar liberror-prone-jar libgeronimo-annotation-1.3-spec-jar libgeronimo-interceptor-3.0-spec-jar libguava-jar libguice-jar libjansi-jar
  libjsr305-jar libmaven-parent-jar libmaven-resolver-jar libmaven-shared-utils-jar libmaven3-core-jar libplexus-cipher-jar libplexus-classworlds-jar
  libplexus-component-annotations-jar libplexus-interpolation-jar libplexus-sec-dispatcher-jar libplexus-utils2-jar libsisu-inject-jar libsisu-plexus-jar
  libsisu4-jar libwagon-file-jar libwagon-http-shaded-jar libwagon-provider-api-jar
Suggested packages:
  libatinject-jsr330-api-jar libel-api-jar libcommons-io-jar-doc libasm-jar libcglib-jar libjsr305-jar-doc libmaven-shared-utils-jar-doc liblogback-jar
  libplexus-utils2-jar doc junit4 testing libcommons-logging-jar liblog4j1.2-jar
The following NEW packages will be installed:
  libbaopalliance-java libapache-pom-jar libatinject-jsr330-api-jar libcdi-api-jar libcommons-cli-jar libcommons-io-jar libcommons-lang3-jar
  libcommons-parent-jar liberror-prone-jar libgeronimo-annotation-1.3-spec-jar libgeronimo-interceptor-3.0-spec-jar libguava-jar libguice-jar libjansi-jar
  libjsr305-jar libmaven-parent-jar libmaven-resolver-jar libmaven-shared-utils-jar libmaven3-core-jar libplexus-cipher-jar libplexus-classworlds-jar
  libplexus-component-annotations-jar libplexus-interpolation-jar libplexus-sec-dispatcher-jar libplexus-utils2-jar libsisu-inject-jar libsisu-plexus-jar
  libsisu4-jar libwagon-file-jar libwagon-http-shaded-jar libwagon-provider-api-jar maven
0 upgraded, 32 newly installed, 0 to remove and 78 not upgraded.
Need to get 10.1 MB of archives.
After this operation, 13.1 MB of additional disk space will be used.
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 libapache-pom-jar all 29-2 [5284 B]
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 libatinject-jsr330-api-jar all 1.0+ds1-5 [5348 B]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 libgeronimo-interceptor-3.0-spec-jar libguava-jar libguice-jar libjansi-jar
Get:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 libcdi-api-jar all 1.2-3 [54.3 kB]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 libcommons-cli-jar all 1.6.0-1 [59.9 kB]
i-054fc0d3fe7cd81e5 (manual-deployment)
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255
```

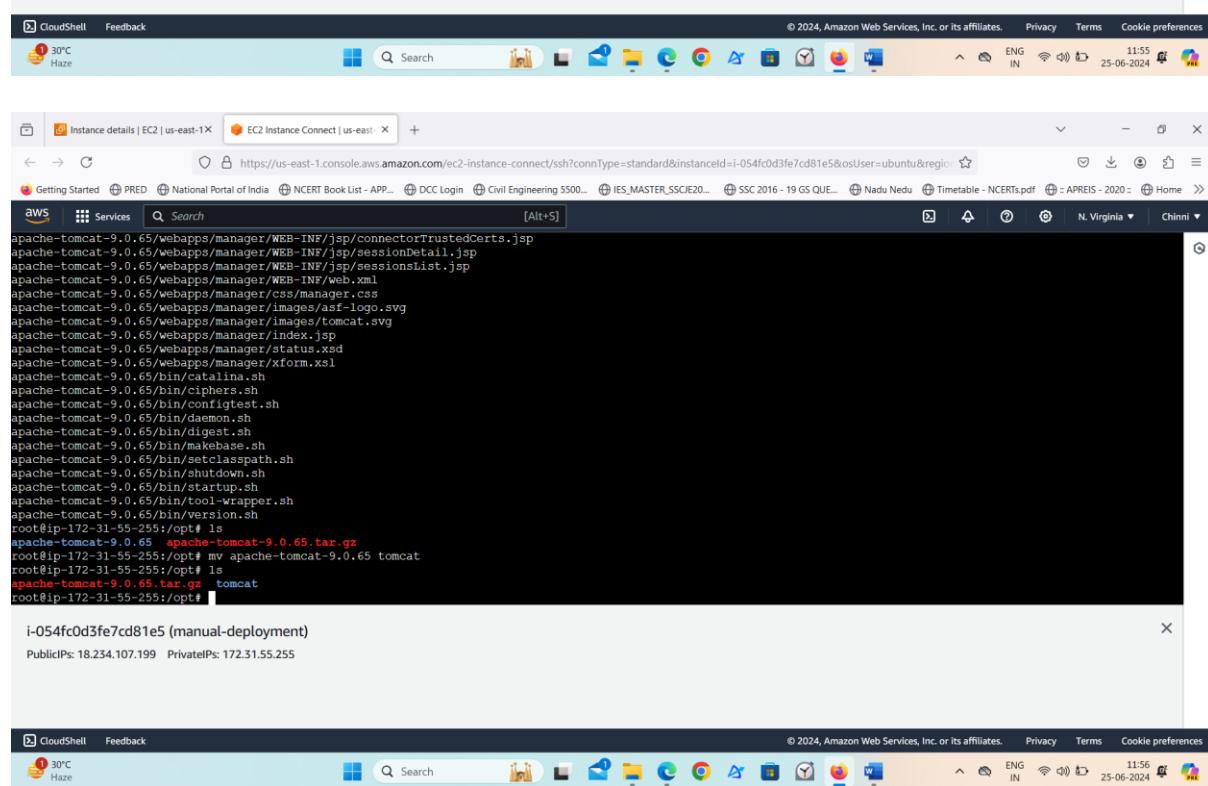
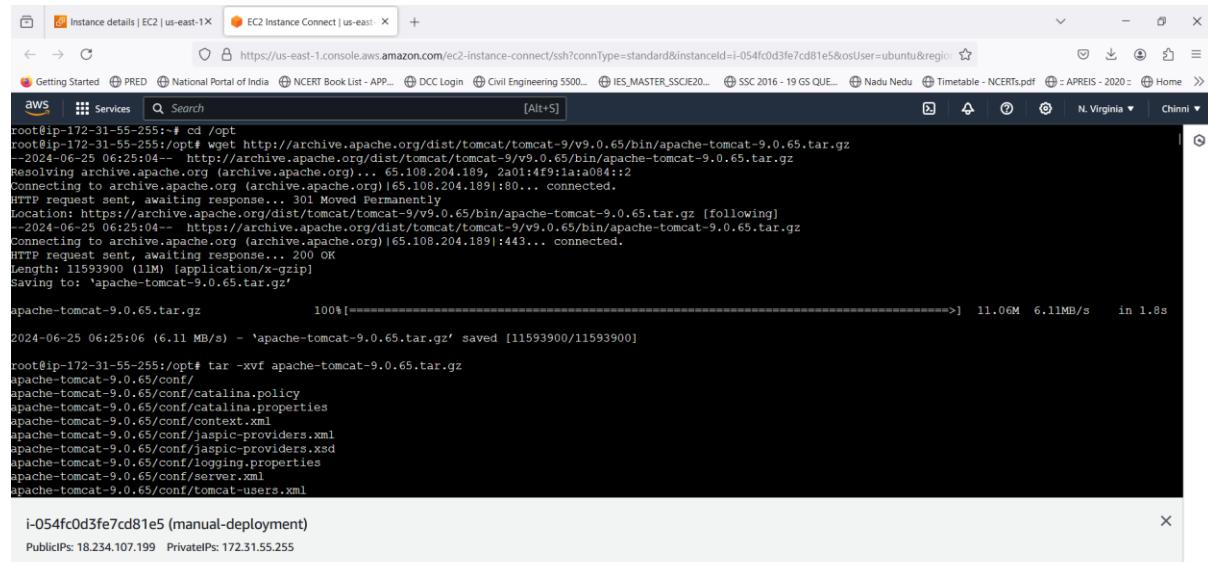
Installation of tomcat:

```
cd /opt
```

`wget http://archive.apache.org/dist/tomcat/tomcat-9/v9.0.65/bin/apache-tomcat-9.0.65.tar.gz`

After the download finishes, we have to extract it using the following command:

```
tar -xvf apache-tomcat-9.0.65.tar.gz
```



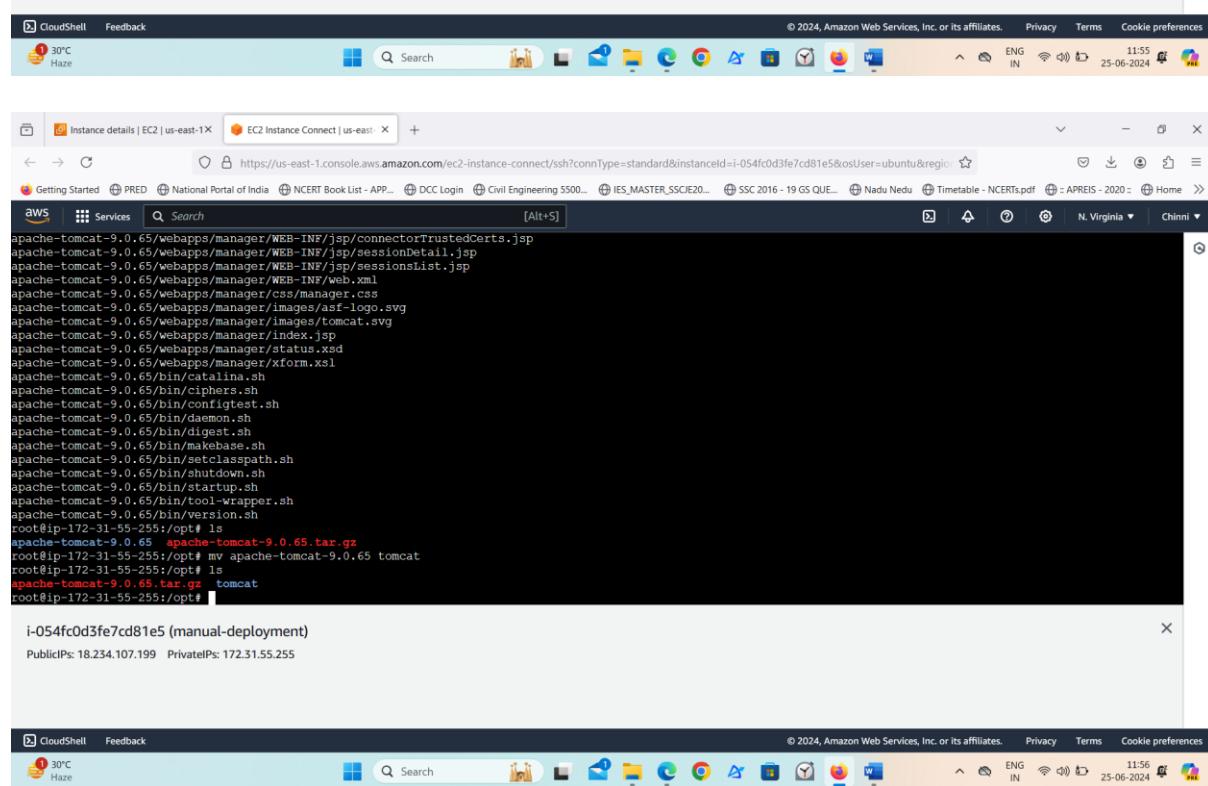
```
root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# wget http://archive.apache.org/dist/tomcat/tomcat-9/v9.0.65/bin/apache-tomcat-9.0.65.tar.gz
--2024-06-25 06:25:04--  http://archive.apache.org/dist/tomcat/tomcat-9/v9.0.65/bin/apache-tomcat-9.0.65.tar.gz
Resolving archive.apache.org (archive.apache.org)... 65.108.204.189, 2a01:4f91:a:084::2
Connecting to archive.apache.org (archive.apache.org)|65.108.204.189|:80...
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://archive.apache.org/dist/tomcat/tomcat-9/v9.0.65/bin/apache-tomcat-9.0.65.tar.gz [following]
--2024-06-25 06:25:04--  https://archive.apache.org/dist/tomcat/tomcat-9/v9.0.65/bin/apache-tomcat-9.0.65.tar.gz
Connecting to archive.apache.org (archive.apache.org)|65.108.204.189|:443...
HTTP request sent, awaiting response... 200 OK
Length: 11593900 (11M) [application/x-gzip]
Saving to: 'apache-tomcat-9.0.65.tar.gz'

apache-tomcat-9.0.65.tar.gz      100%[=====]  11.06M  6.11MB/s   in 1.8s

2024-06-25 06:25:06 (6.11 MB/s) - 'apache-tomcat-9.0.65.tar.gz' saved [11593900/11593900]

root@ip-172-31-55-255:/opt# tar -xvf apache-tomcat-9.0.65.tar.gz
apache-tomcat-9.0.65/conf/
apache-tomcat-9.0.65/conf/catalina.policy
apache-tomcat-9.0.65/conf/catalina.properties
apache-tomcat-9.0.65/conf/context.xml
apache-tomcat-9.0.65/conf/jaspic-providers.xml
apache-tomcat-9.0.65/conf/jaspic-providers.xsd
apache-tomcat-9.0.65/conf/logging.properties
apache-tomcat-9.0.65/conf/server.xml
apache-tomcat-9.0.65/conf/tomcat-users.xml

i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```



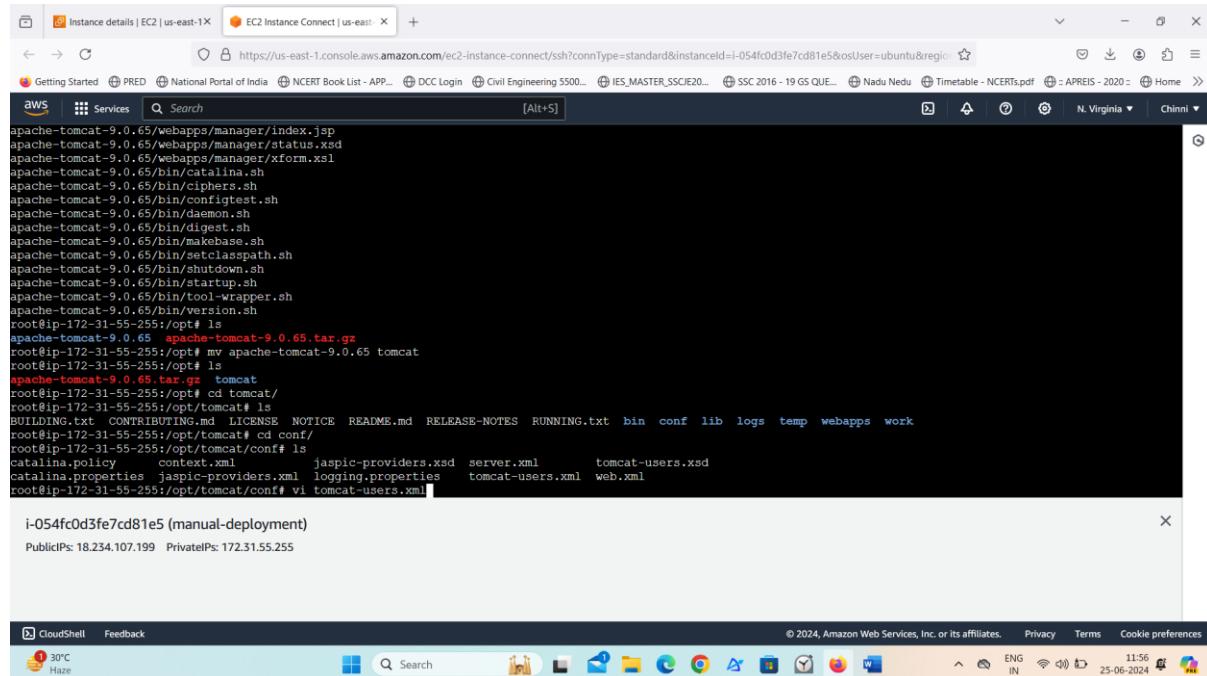
Renaming the apache-tomact-9.0.65.tar.gz to tomcat

```
Now, cd /opt/tomcat/conf
```

vi tomcat-users.xml

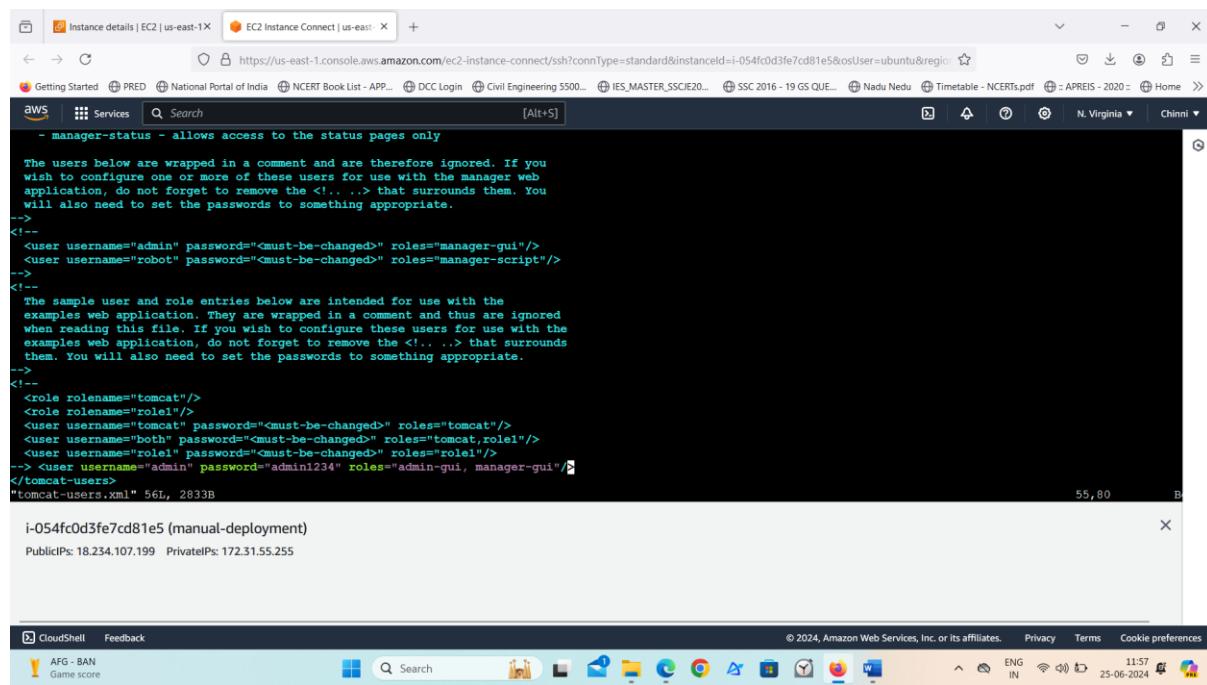
Type **i** on the keyboard for insert then scroll down to the **second** to last line in the file and type:

```
<user username="admin" password="admin1234" roles="admin-gui, manager-gui"/>
```



```
apache-tomcat-9.0.65/webapps/manager/index.jsp
apache-tomcat-9.0.65/webapps/manager/status.xsd
apache-tomcat-9.0.65/webapps/manager/xform.xsl
apache-tomcat-9.0.65/bin/catalina.sh
apache-tomcat-9.0.65/bin/ciphers.sh
apache-tomcat-9.0.65/bin/configtest.sh
apache-tomcat-9.0.65/bin/daemon.sh
apache-tomcat-9.0.65/bin/digest.sh
apache-tomcat-9.0.65/bin/makebase.sh
apache-tomcat-9.0.65/bin/setclasspath.sh
apache-tomcat-9.0.65/bin/shutdown.sh
apache-tomcat-9.0.65/bin/startup.sh
apache-tomcat-9.0.65/bin/tool-wrapper.sh
apache-tomcat-9.0.65/bin/version.sh
root@ip-172-31-55-255:/opt# ls
apache-tomcat-9.0.65 apache-tomcat-9.0.65.tar.gz
root@ip-172-31-55-255:/opt# mv apache-tomcat-9.0.65 tomcat
root@ip-172-31-55-255:/opt#
apache-tomcat-9.0.65.tar.gz tomcat
root@ip-172-31-55-255:/opt# cd tomcat/
root@ip-172-31-55-255:/opt/tomcat# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
root@ip-172-31-55-255:/opt/tomcat# cd conf/
root@ip-172-31-55-255:/opt/tomcat/conf# ls
catalina.policy context.xml jaspic-providers.xsd server.xml tomcat-users.xml
catalina.properties jaspic-providers.xml logging.properties tomcat-users.xml web.xml
root@ip-172-31-55-255:/opt/tomcat/conf# vi tomcat-users.xml
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255



```
- manager-status - allows access to the status pages only

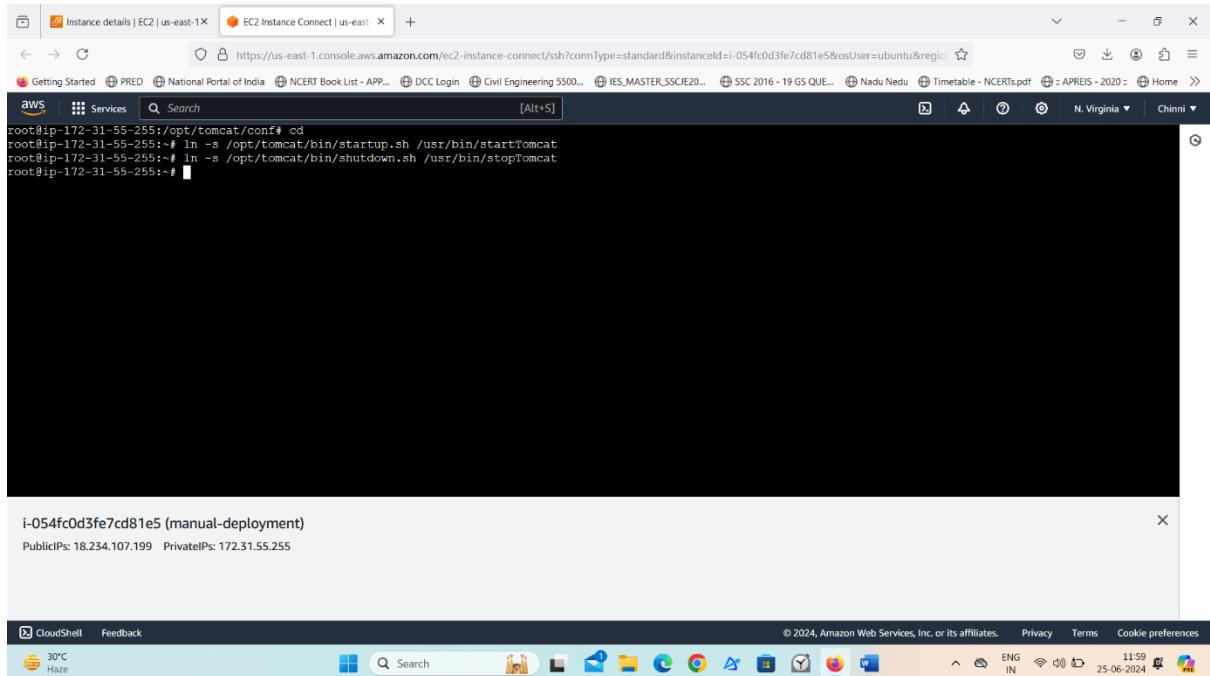
The users below are wrapped in a comment and are therefore ignored. If you
wish to configure one or more of these users for use with the manager web
application, do not forget to remove the <!... ...> that surrounds them. You
will also need to set the passwords to something appropriate.
-->
<!--
<user username="admin" password="" roles="manager-gui"/>
<user username="robot" password="" roles="manager-script"/>
-->
<!--
The sample user and role entries below are intended for use with the
examples web application. They are wrapped in a comment and thus are ignored
when reading this file. If you wish to configure these users for use with the
examples web application, do not forget to remove the <!... ...> that surrounds
them. You will also need to set the passwords to something appropriate.
-->
<!--
<role rolename="tomcat"/>
<role rolename="role1"/>
<user username="tomcat" password="" roles="tomcat"/>
<user username="both" password="" roles="tomcat,role1"/>
<user username="role1" password="" roles="role1"/>
--><user username="admin" password="admin1234" roles="admin-gui, manager-gui"/>
</tomcat-users>
"tomcat-users.xml" 56L, 2833B
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255

CloudShell Feedback © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences ENG IN 11:57 25-06-2024

Now press **escape** then: **wq** and finally **enter** to save and quit the file. **cd**

In the next step we will be creating a **symboliclink** for **startup.sh** and **shutdown**



The screenshot shows a terminal window within the AWS CloudShell interface. The user is running a Linux instance (Ubuntu) and navigating to the Tomcat configuration directory. They then run two commands to create symbolic links:

```
root@ip-172-31-55-255:/opt/tomcat/conf# cd
root@ip-172-31-55-255:# ln -s /opt/tomcat/bin/startup.sh /usr/bin/startTomcat
root@ip-172-31-55-255:# ln -s /opt/tomcat/bin/shutdown.sh /usr/bin/stopTomcat
```

Below the terminal, the CloudShell interface displays the instance details: i-054fc0d3fe7cd81e5 (manual-deployment), PublicIPs: 18.234.107.199, PrivateIPs: 172.31.55.255.

- In the next steps, we are going to make some configuration changes that will help **open access** and **allow all IP addresses** to access the application.
- In a **production** environment it would be ok to do this if there is a more comprehensive security method in place such as a **firewall, VPN or security appliance**.
- Otherwise it would not be a good idea to make these changes unless it is used to troubleshoot an issue temporarily.
- Ok, let's go ahead and make those config changes:
- vi /opt/tomcat/webapps/manager/META-INF/context.xml
- Here we are going to comment out the line that starts with <Valve
- We need to add <!-- at the beginning of that line and at the end of it. -->
- Now save and exit.

The screenshot shows a browser window with two tabs: "Instance details | EC2 | us-east-1" and "EC2 Instance Connect | us-east-1". The main content area displays a terminal session on an EC2 instance. The user has run several commands to navigate to the Tomcat configuration directory and edit the context.xml file. The terminal output includes:

```

root@ip-172-31-55-255:/opt/tomcat/conf# cd
root@ip-172-31-55-255:~# ln -s /opt/tomcat/bin/startup.sh /usr/bin/startTomcat
root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# ls
apache-tomcat-9.0.65.tar.gz tomcat
root@ip-172-31-55-255:/opt# cd tomcat/
root@ip-172-31-55-255:/opt/tomcat# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
root@ip-172-31-55-255:/opt/tomcat# cd webapps/
root@ip-172-31-55-255:/opt/tomcat/webapps# ls
ROOT docs examples host-manager manager
root@ip-172-31-55-255:/opt/tomcat/webapps# cd host-manager/
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager# ls
META-INF WEB-INF css images index.jsp
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager# cd META-INF/
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager/META-INF# ls
context.xml
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager/META-INF# vi context.xml

```

Below the terminal, a message box displays:

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The AWS CloudShell interface is also visible at the bottom, showing the same terminal session and system status.

- We need to do the same with the next file:
- vi /opt/tomcat/webapps/host-manager/META-INF/context.xml
- Comment out the same <Valve line
- Then save and exit again.

```

root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# ls
apache-tomcat-9.0.65.tar.gz tomcat
root@ip-172-31-55-255:/opt# cd tomcat/
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
root@ip-172-31-55-255:/opt/tomcat# cd webapps/
root@ip-172-31-55-255:/opt/tomcat/webapps# ls
ROOT docs examples host-manager manager
root@ip-172-31-55-255:/opt/tomcat/webapps# cd host-manager/
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager# ls
META-INF WEB-INF css images index.jsp
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager# cd META-INF/
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager/META-INF# ls
context.xml
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager/META-INF# vi context.xml
root@ip-172-31-55-255:/opt/tomcat/webapps/host-manager/META-INF# cd ..
root@ip-172-31-55-255:/opt/tomcat/webapps# ls
ROOT docs examples host-manager manager
root@ip-172-31-55-255:/opt/tomcat/webapps/manager# cd manager/
root@ip-172-31-55-255:/opt/tomcat/webapps/manager# ls
META-INF WEB-INF css images index.jsp status.xhtml xform.xhtml
root@ip-172-31-55-255:/opt/tomcat/webapps/manager# cd META-INF/
root@ip-172-31-55-255:/opt/tomcat/webapps/manager/META-INF# ls
context.xml
root@ip-172-31-55-255:/opt/tomcat/webapps/manager/META-INF# vi context.xml

```

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```

<?xml version="1.0" encoding="UTF-8"?>
<!--
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contributor license agreements. See the NOTICE file distributed with
this work for additional information regarding copyright ownership.
The ASF licenses this file to You under the Apache License, Version 2.0
(the "License"); you may not use this file except in compliance with
the License. You may obtain a copy of the License at
http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License.
-->
<Context antiResourceLocking="false" privileged="true" >
<CookieProcessor className="org.apache.tomcat.util.http.Rfc6265CookieProcessor"
    sameSiteCookies="strict" />
<!-- <Valve className="org.apache.catalina.valves.RemoteAddrValve"
allow="127\.\d+\.\d+::1|0:0:0:0:0:1" /> -->
<Manager sessionAttributeValueClassNameFilter="java\.lang\.(\?:Boolean|Integer|Long|Number|String)|org\.apache\.catalina\.filters\.CsrfPreventionFilter\$LruCache\?|\?|java\.util\.(\?:Linked)?HashMap"/>
</Context>
-- INSERT --

```

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- We are done installing and configuring Tomcat!!!

Now type cd ~

Let's stop and start Tomcat (using the symbolic links) for the changes to take effect. Type:

stopTomcat

```

root@ip-172-31-55-255:~# stopTomcat
Using CATALINA_BASE: /opt/tomcat
Using CATALINA_HOME: /opt/tomcat
Using CATALINA_TMPDIR: /opt/tomcat/temp
Using JRE_HOME: /usr
Using CLASSPATH: /opt/tomcat/bin/bootstrap.jar:/opt/tomcat/bin/tomcat-juli.jar
Using CATALINA_OPTS:
NOTE: Picked up JDk JAVA OPTIONS: --add-opens=java.base/java.lang=ALL-UNNAMED --add-opens=java.base/java.io=ALL-UNNAMED --add-opens=java.base/java.util=ALL-UNNAMED
--add-opens=java.base/java.util.concurrent=ALL-UNNAMED --add-opens=java.rmi/sun.rmi.transport=ALL-UNNAMED
Jun 25, 2024 6:32:31 AM org.apache.catalina.startup.Catalina stopServer
SEVERE: Could not contact [localhost:8005] (base port [8005] and offset [0]). Tomcat may not be running.
Jun 25, 2024 6:32:31 AM org.apache.catalina.startup.Catalina stopServer
SEVERE: Error stopping Catalina
java.net.ConnectException: Connection refused
        at java.base/sun.nio.ch.Net.connect0(Native Method)
        at java.base/sun.nio.ch.Net.connect(Net.java:589)
        at java.base/sun.nio.ch.Net.connect(Net.java:578)
        at java.base/sun.nio.ch.NioSocketImpl.connect(NioSocketImpl.java:583)
        at java.base/java.net.SocksSocketImpl.connect(SocksSocketImpl.java:327)
        at java.base/java.net.Socket.connect(Socket.java:751)
        at java.base/java.net.Socket.connect(Socket.java:686)
        at java.base/java.net.Socket.<init>(Socket.java:555)
        at java.base/java.net.Socket.<init>(Socket.java:324)
        at org.apache.catalina.startup.Catalina.stopServer(Catalina.java:667)
        at java.base/jdk.internal.reflect.DirectMethodHandleAccessor.invoke(DirectMethodHandleAccessor.java:103)
        at java.base/java.lang.reflect.Method.invoke(Method.java:580)
        at org.apache.catalina.startup.Bootstrap.stopServer(Bootstrap.java:391)

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```

## startTomcat

```

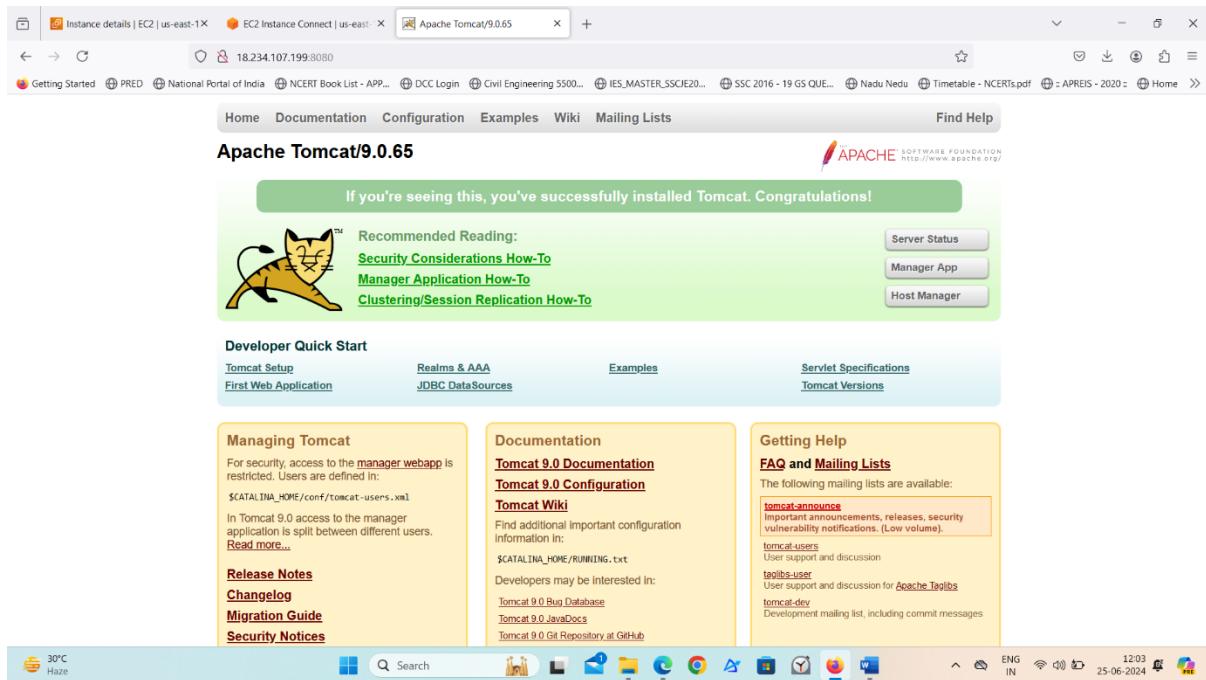
Jun 25, 2024 6:32:31 AM org.apache.catalina.startup.Catalina stopServer
SEVERE: Error stopping Catalina
java.net.ConnectException: Connection refused
        at java.base/sun.nio.ch.Net.connect0(Native Method)
        at java.base/sun.nio.ch.Net.connect(Net.java:589)
        at java.base/sun.nio.ch.Net.connect(Net.java:578)
        at java.base/sun.nio.ch.NioSocketImpl.connect(NioSocketImpl.java:583)
        at java.base/java.net.SocksSocketImpl.connect(SocksSocketImpl.java:327)
        at java.base/java.net.Socket.connect(Socket.java:751)
        at java.base/java.net.Socket.connect(Socket.java:686)
        at java.base/java.net.Socket.<init>(Socket.java:555)
        at java.base/java.net.Socket.<init>(Socket.java:324)
        at org.apache.catalina.startup.Catalina.stopServer(Catalina.java:667)
        at java.base/jdk.internal.reflect.DirectMethodHandleAccessor.invoke(DirectMethodHandleAccessor.java:103)
        at java.base/java.lang.reflect.Method.invoke(Method.java:580)
        at org.apache.catalina.startup.Bootstrap.stopServer(Bootstrap.java:391)
        at org.apache.catalina.startup.Bootstrap.main(Bootstrap.java:461)

root@ip-172-31-55-255:~# startTomcat
Using CATALINA_BASE: /opt/tomcat
Using CATALINA_HOME: /opt/tomcat
Using CATALINA_TMPDIR: /opt/tomcat/temp
Using JRE_HOME: /usr
Using CLASSPATH: /opt/tomcat/bin/bootstrap.jar:/opt/tomcat/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started
root@ip-172-31-55-255:~# 

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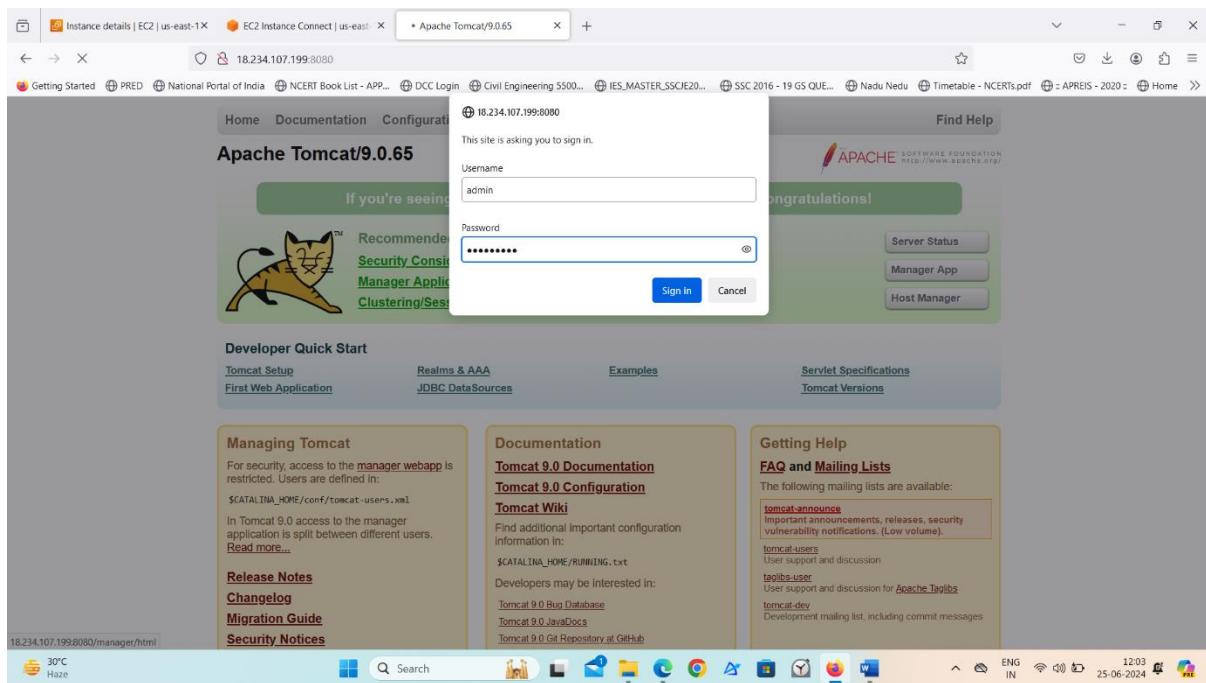
```

To access Tomcat, we need to grab the public IP of our instance and append :8080 to it.



For accessing manager app.

Give its password and username. As we mentioned in tomcat user.xml file.



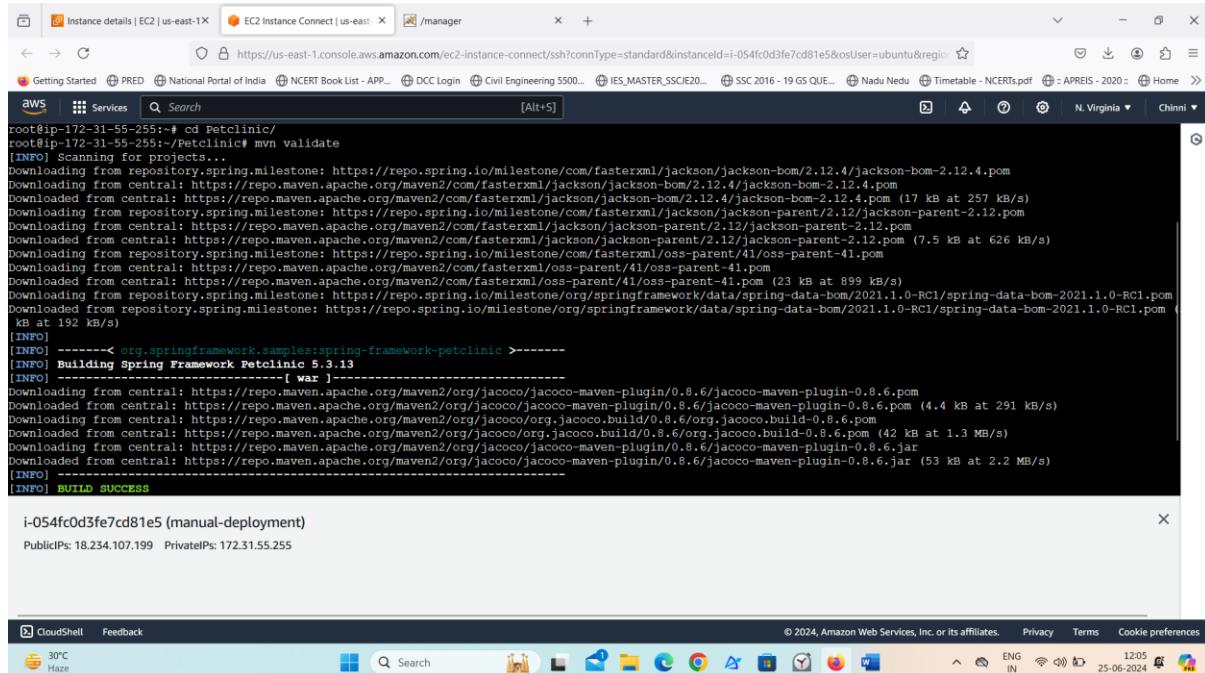
## Deploying the petclinic application

Let's clone the repo where the app is located:

```
git clone https://github.com/vommidapuchinni/Petclinic.git
```

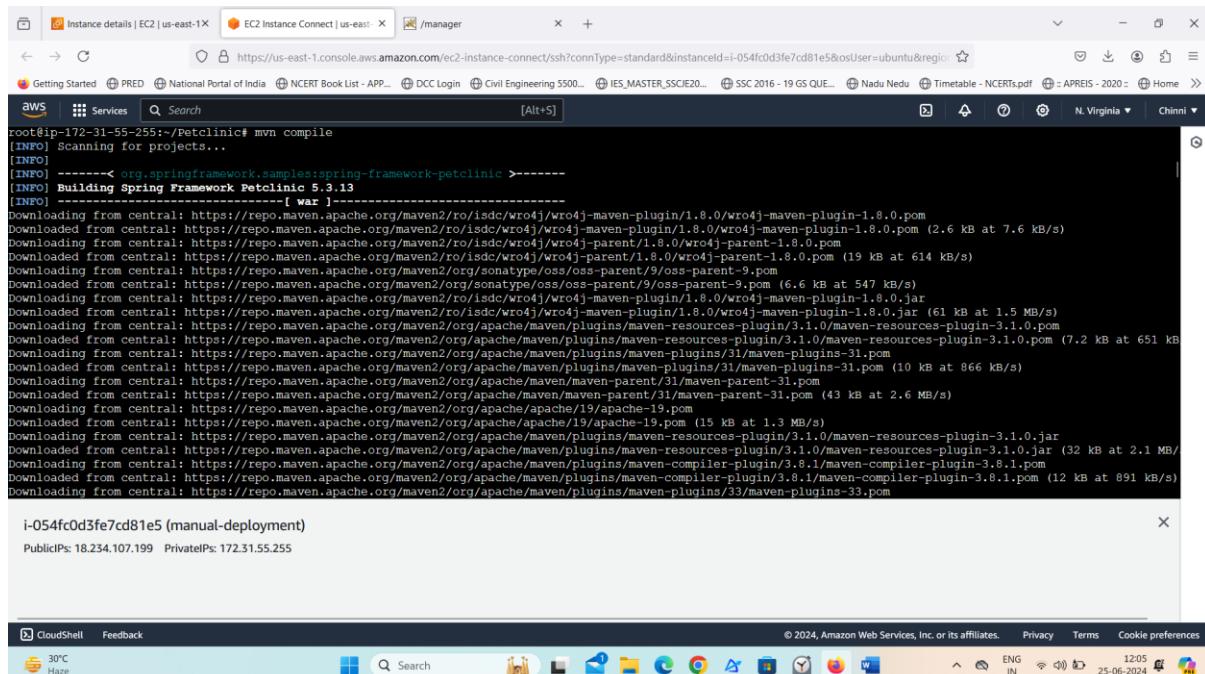
cd into Petclinic and once the download finishes run:

**mvn validate:** mvn validate checks the project structure and verifies that all necessary information is available before building.



```
root@ip-172-31-55-255:~/Petclinic# mvn validate
[INFO] Scanning for projects...
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/com/fasterxml/jackson/jackson-bom/2.12.4/jackson-bom-2.12.4.pom
Downloading from central: https://repo.maven.apache.org/maven2/com/fasterxml/jackson/jackson-bom/2.12.4/jackson-bom-2.12.4.pom (17 kB at 257 kB/s)
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/com/fasterxml/jackson/jackson-parent/2.12/jackson-parent-2.12.pom
Downloading from central: https://repo.maven.apache.org/maven2/com/fasterxml/jackson/jackson-parent/2.12/jackson-parent-2.12.pom
Downloaded from central: https://repo.maven.apache.org/maven2/com/fasterxml/jackson/jackson-parent/2.12/jackson-parent-2.12.pom (7.5 kB at 626 kB/s)
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/com/fasterxml/jackson/jackson-parent/2.12/jackson-parent-2.12.pom
Downloading from central: https://repo.maven.apache.org/maven2/com/fasterxml/jackson/jackson-parent/2.12/jackson-parent-2.12.pom (192 kB/s)
[INFO]
[INFO] -----< org.springframework.samples:spring-framework-petclinic >-----
[INFO] Building Spring Framework Petclinic 5.3.13
[INFO] -----[ war ]
Downloading from central: https://repo.maven.apache.org/maven2/org/jacoco/jacoco-maven-plugin/0.8.6/jacoco-maven-plugin-0.8.6.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/jacoco/jacoco-maven-plugin/0.8.6/jacoco-maven-plugin-0.8.6.pom (4.4 kB at 291 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/jacoco/org.jacoco.build/0.8.6/org.jacoco.build-0.8.6.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/jacoco/org.jacoco.build/0.8.6/org.jacoco.build-0.8.6.pom (42 kB at 1.3 MB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/jacoco/org.jacoco-maven-plugin/0.8.6/jacoco-maven-plugin-0.8.6.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/jacoco/jacoco-maven-plugin/0.8.6/jacoco-maven-plugin-0.8.6.jar (53 kB at 2.2 MB/s)
[INFO]
[INFO] BUILD SUCCESS
i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```

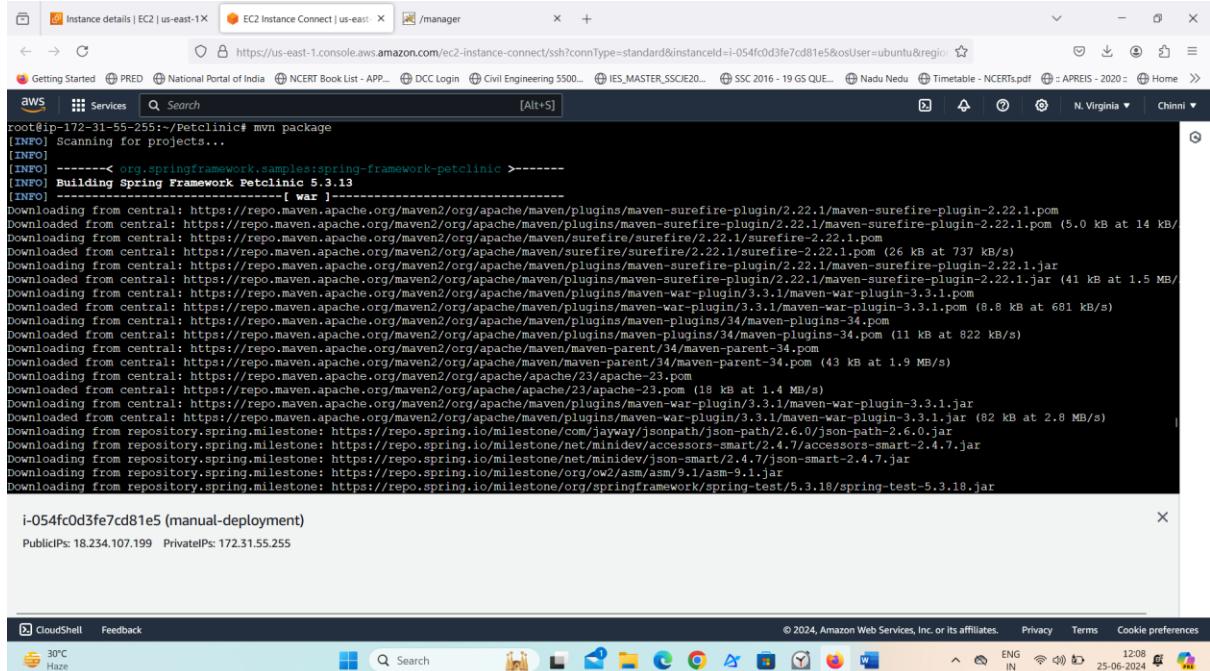
**mvn compile:** mvn compile in Maven will compile the source code of a project, including resolving dependencies and generating target/classes directory with compiled bytecode.



```
root@ip-172-31-55-255:~/Petclinic# mvn compile
[INFO] Scanning for projects...
[INFO] -----< org.springframework.samples:spring-framework-petclinic >-----
[INFO] Building Spring Framework Petclinic 5.3.13
[INFO] -----[ war ]
Downloading from central: https://repo.maven.apache.org/maven2/org/liquibase/wro4j/wro4j-maven-plugin/1.8.0/wro4j-maven-plugin-1.8.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/liquibase/wro4j/wro4j-maven-plugin/1.8.0/wro4j-maven-plugin-1.8.0.pom (2.6 kB at 7.6 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/liquibase/wro4j/wro4j-parent/1.8.0/wro4j-parent-1.8.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/liquibase/wro4j/wro4j-parent/1.8.0/wro4j-parent-1.8.0.pom (19 kB at 614 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/sonatype/oss/oss-parent/9/oss-parent-9.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/sonatype/oss/oss-parent/9/oss-parent-9.pom (6.6 kB at 547 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/liquibase/wro4j/wro4j-maven-plugin/1.8.0/wro4j-maven-plugin-1.8.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/liquibase/wro4j/wro4j-maven-plugin/1.8.0/wro4j-maven-plugin-1.8.0.jar (61 kB at 1.5 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/3.1.0/maven-resources-plugin-3.1.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/3.1.0/maven-resources-plugin-3.1.0.pom (7.2 kB at 651 kB)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/31/maven-resources-31.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/31/maven-resources-31.pom (10 kB at 866 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/maven-parent/31/maven-parent-31.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/31/maven-parent-31.pom (43 kB at 2.6 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/apache/19/apache-19.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/apache/19/apache-19.pom (15 kB at 1.3 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/3.1.0/maven-resources-plugin-3.1.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/3.1.0/maven-resources-plugin-3.1.0.jar (32 kB at 2.1 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-compiler-plugin/3.8.1/maven-compiler-plugin-3.8.1.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-compiler-plugin/3.8.1/maven-compiler-plugin-3.8.1.pom (12 kB at 891 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins-33.pom
```

**mvn package:** It compiles the source code, packages it into a distributable format such as JAR, and copies it to the target directory.

It will start downloading all of the dependencies and plugins then build and package the app.



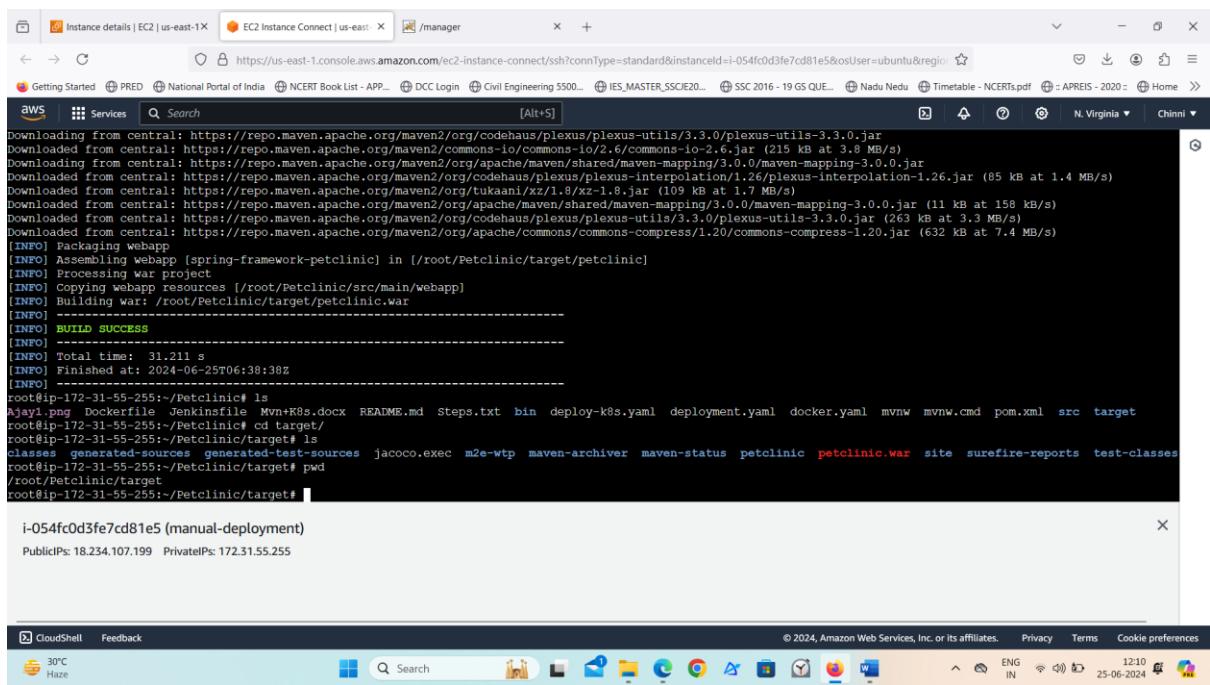
```
root@ip-172-31-55-255:~/Petclinic# mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] < org.springframework.samples:spring-framework-petclinic >-----
[INFO] Building Spring Framework Petclinic 5.3.13
[INFO] -----[ war ]-----
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.22.1/maven-surefire-plugin-2.22.1.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.22.1/maven-surefire-plugin-2.22.1.pom (5.0 kB at 14 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire/2.22.1/surefire-2.22.1.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire/2.22.1/surefire-2.22.1.pom (26 kB at 737 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.22.1/maven-surefire-plugin-2.22.1.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.22.1/maven-surefire-plugin-2.22.1.jar (41 kB at 1.5 MB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.3.1/maven-war-plugin-3.3.1.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.3.1/maven-war-plugin-3.3.1.pom (8.8 kB at 681 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/34/maven-plugins-34.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-parent/34/maven-parent-34.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/34/maven-parent-34.pom (11 kB at 822 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/apache/23/apache-23.pom
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/apache/23/apache-23.pom (18 kB at 1.4 MB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.3.1/maven-war-plugin-3.3.1.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.3.1/maven-war-plugin-3.3.1.jar (82 kB at 2.8 MB/s)
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/com/jayway/jsonpath/json-path/2.6.0/json-path-2.6.0.jar
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/net/minidev/accessors-smart/2.4.7/accessors-smart-2.4.7.jar
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/net/minidev/json-smart/2.4.7/json-smart-2.4.7.jar
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/org/ow2/asf/asym/9.1.1asm/9.1.1asm-9.1.jar
Downloading from repository.spring.milestone: https://repo.spring.io/milestone/org/springframework/spring-test/5.3.18/spring-test-5.3.18.jar

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```

If you ls now, you should see the target folder.

cd into the target folder and if you ls again you will see the war file. This is the artifact that we need to copy into Tomcat.

type pwd so that we can get the source artifact path.



```
root@ip-172-31-55-255:~/Petclinic# mvn package
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.3.0/plexus-utils-3.3.0.jar
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/commons-io/2.6/commons-io-2.6.jar (215 kB at 3.8 MB/s)
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-mapping/3.0.0/maven-mapping-3.0.0.jar
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-interpolation/1.26/plexus-interpolation-1.26.jar (85 kB at 1.4 MB/s)
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/tukano/xz/1.8/xz-1.8.jar (109 kB at 1.7 MB/s)
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-mapping/3.0.0/maven-mapping-3.0.0.jar (11 kB at 158 kB/s)
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.3.0/plexus-utils-3.3.0.jar (263 kB at 3.3 MB/s)
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/commons/commons-compress/1.20/commons-compress-1.20.jar (632 kB at 7.4 MB/s)
[INFO] Packaging webapp
[INFO] Assembling webapp [spring-framework-petclinic] in [/root/Petclinic/target/petclinic]
[INFO] Processing war project
[INFO] Copying webapp resources [/root/Petclinic/src/main/webapp]
[INFO] Building war: /root/Petclinic/target/petclinic.war
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 31.211 s
[INFO] Finished at: 2024-06-25T06:38:30Z
[INFO] -----
root@ip-172-31-55-255:~/Petclinic# ls
Ajay1.png Dockerfile Jenkinsfile Mvn+R8s.docx README.md Steps.txt bin deploy-k8s.yaml deployment.yaml docker.yaml mvnw mvnw.cmd pom.xml src target
root@ip-172-31-55-255:~/Petclinic# cd target/
root@ip-172-31-55-255:~/Petclinic/target# ls
classes generated-sources generated-test-sources jacoco.exec m2e-wtp maven-archiver maven-status petclinic petclinic.war site surefire-reports test-classes
root@ip-172-31-55-255:~/Petclinic/target# pwd
/root/Petclinic/target
root@ip-172-31-55-255:~/Petclinic/target#
```

i-054fc0d3fe7cd81e5 (manual-deployment)

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Now we need to get the destination path for Tomcat. To make it easier we can open a new session then sudo su and follow these commands one by one:

- cd ~
- cd tomcat
- cd webapps
- pwd

```
[INFO] Building war: /root/Petclinic/target/petclinic.war
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 31.211 s
[INFO] Finished at: 2024-06-25T06:38:38Z
[INFO]
root@ip-172-31-55-255:~/Petclinic# ls Jenkinsfile Mvn+K8s.docx README.md Steps.txt bin deploy-k8s.yaml deployment.yaml docker.yaml mvnw mvnw.cmd pom.xml src target
root@ip-172-31-55-255:~/Petclinic# cd target/
root@ip-172-31-55-255:~/Petclinic/target# ls
classes generated-sources generated-test-sources jacoco.exec m2e-wtp maven-archiver maven-status petclinic petclinic.war site surefire-reports test-classes
root@ip-172-31-55-255:~/Petclinic/target# pwd
/root/Petclinic/target
root@ip-172-31-55-255:~/Petclinic/target# d
d: command not found
root@ip-172-31-55-255:~/Petclinic/target# cd
root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# cd tomcat/
root@ip-172-31-55-255:/opt/tomcat# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
root@ip-172-31-55-255:/opt/tomcat# cd webapps/
root@ip-172-31-55-255:/opt/tomcat/webapps# ls
ROOT docs examples host-manager manager
root@ip-172-31-55-255:/opt/tomcat/webapps# pwd
/opt/tomcat/webapps
root@ip-172-31-55-255:/opt/tomcat/webapps# i-054fc0d3fe7cd81e5 (manual-deployment)
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255
```

The screenshot shows a CloudShell window with a terminal session. The user has run Maven commands to build a WAR file and then navigated to the Tomcat webapps directory. The terminal output includes the build log, the contents of the target directory, and the current working directory. The AWS navigation bar and status bar are visible at the top and bottom respectively.

- We now have the destination file path.
- Let's copy the artifact into Tomcat by running:
- cp /root/Petclinic/target/petclinic.war /opt/tomcat/webapps/

```
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 31.211 s
[INFO] Finished at: 2024-06-25T06:38:38Z
[INFO]
root@ip-172-31-55-255:~/Petclinic# ls Jenkinsfile Mvn+K8s.docx README.md Steps.txt bin deploy-k8s.yaml deployment.yaml docker.yaml mvnw mvnw.cmd pom.xml src target
root@ip-172-31-55-255:~/Petclinic# cd target/
root@ip-172-31-55-255:~/Petclinic/target# ls
classes generated-sources generated-test-sources jacoco.exec m2e-wtp maven-archiver maven-status petclinic petclinic.war site surefire-reports test-classes
root@ip-172-31-55-255:~/Petclinic/target# pwd
/root/Petclinic/target
root@ip-172-31-55-255:~/Petclinic/target# d
d: command not found
root@ip-172-31-55-255:~/Petclinic/target# cd
root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# cd tomcat/
root@ip-172-31-55-255:/opt/tomcat# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
root@ip-172-31-55-255:/opt/tomcat# cd webapps/
root@ip-172-31-55-255:/opt/tomcat/webapps# ls
ROOT docs examples host-manager manager
root@ip-172-31-55-255:/opt/tomcat/webapps# pwd
/opt/tomcat/webapps
root@ip-172-31-55-255:/opt/tomcat/webapps# cd
root@ip-172-31-55-255:~# cp /root/Petclinic/target/petclinic.war /opt/tomcat/webapps
root@ip-172-31-55-255:~# i-054fc0d3fe7cd81e5 (manual-deployment)
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255
```

This screenshot shows the continuation of the CloudShell session. The user has run the cp command to move the WAR file from the local build directory to the Tomcat webapps directory. The terminal output shows the command being run and the resulting file listing in the webapps directory. The AWS interface remains consistent with the previous screenshot.

Go back to the browser refresh the page we see their petclinic.

The screenshot shows a Windows desktop environment with a browser window open to the Tomcat Web Application Manager at 18.234.107.199:8080/manager/html. The title bar of the browser says "/manager". The page header includes links for "Getting Started", "PRED", "National Portal of India", "NCERT Book List - APP...", "DCC Login", "Civil Engineering 5500...", "IES\_MASTER\_SSCE20...", "SSC 2016 - 19 GS QUE...", "Nadu Nedu", "Timetable - NCERTs.pdf", "APREIS - 2020", and "Home". On the right, there is a logo for "THE APACHE SOFTWARE FOUNDATION" with a feather icon. The main content area is titled "Tomcat Web Application Manager". It features a "Message:" field with "OK" and a "Manager" navigation bar with tabs for "List Applications", "HTML Manager Help", "Manager Help", and "Server Status". Below this is a table titled "Applications" with columns for "Path", "Version", "Display Name", "Running", "Sessions", and "Commands". The table lists several applications: Welcome to Tomcat (Path /, Version None specified, Display Name Welcome to Tomcat, Running true, Sessions 0, Commands Start, Stop, Reload, Undeploy, Expire sessions with idle ≥ 30 minutes), Tomcat Documentation (Path /docs, Version None specified, Display Name Tomcat Documentation, Running true, Sessions 0, Commands Start, Stop, Reload, Undeploy, Expire sessions with idle ≥ 30 minutes), Servlet and JSP Examples (Path /examples, Version None specified, Display Name Servlet and JSP Examples, Running true, Sessions 0, Commands Start, Stop, Reload, Undeploy, Expire sessions with idle ≥ 30 minutes), Tomcat Host Manager Application (Path /host-manager, Version None specified, Display Name Tomcat Host Manager Application, Running true, Sessions 0, Commands Start, Stop, Reload, Undeploy, Expire sessions with idle ≥ 30 minutes), Tomcat Manager Application (Path /manager, Version None specified, Display Name Tomcat Manager Application, Running true, Sessions 1, Commands Start, Stop, Reload, Undeploy, Expire sessions with idle ≥ 30 minutes), and PetClinic (Path /petclinic, Version None specified, Display Name PetClinic, Running false, Sessions 0, Commands Start, Stop, Reload, Undeploy). At the bottom of the page is a "Deploy" bar with a "30°C Haze" weather icon, a search bar, and various system icons. The status bar at the bottom right shows "12:34", "25-06-2024", and "ENG IN".

Click on petclinic we see this page.

The screenshot shows a Windows desktop environment with a browser window open to the PetClinic application at 18.234.107.199:8080/petclinic/. The title bar of the browser says "PetClinic : a Spring Framework". The page header includes links for "Getting Started", "PRED", "National Portal of India", "NCERT Book List - APP...", "DCC Login", "Civil Engineering 5500...", "IES\_MASTER\_SSCE20...", "SSC 2016 - 19 GS QUE...", "Nadu Nedu", "Timetable - NCERTs.pdf", "APREIS - 2020", and "Home". The main content area has a "spring" logo at the top left. It features a "Welcome" section with a photo of a brown puppy and a white cat. Below this is a navigation bar with links for "HOME", "FIND OWNERS", "VETERINARIANS", and "ERROR". The status bar at the bottom right shows "12:13", "25-06-2024", and "ENG IN".

## Deploying the train-ticket-reservation application

Let's clone the repo where the app is located:

```
git clone https://github.com/vommidaapuchinni/train.ticket-reservation.git
```

```

root@ip-172-31-55-255:~# git clone https://github.com/vommida-puchinni/train-ticket-reservation.git
Cloning into 'train-ticket-reservation'...
remote: Enumerating objects: 127, done.
remote: Counting objects: 100% (127/127), done.
remote: Compressing objects: 100% (73/73), done.
remote: Total 127 (delta 51), reused 118 (delta 47), pack-reused 0
Receiving objects: 100% (127/127), 11.71 MiB | 44.26 MiB/s, done.
Resolving deltas: 100% (51/51), done.
root@ip-172-31-55-255:~#

```

i-054fc0d3fe7cd81e5 (manual-deployment)  
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255

cd into train-ticket-reservation and once the download finishes run:

**mvn validate**

```

root@ip-172-31-55-255:~# git clone https://github.com/vommida-puchinni/train-ticket-reservation.git
Cloning into 'train-ticket-reservation'...
remote: Enumerating objects: 127, done.
remote: Counting objects: 100% (127/127), done.
remote: Compressing objects: 100% (73/73), done.
remote: Total 127 (delta 51), reused 118 (delta 47), pack-reused 0
Receiving objects: 100% (127/127), 11.71 MiB | 44.26 MiB/s, done.
Resolving deltas: 100% (51/51), done.
root@ip-172-31-55-255:~# cd train-ticket-reservation/
root@ip-172-31-55-255:~/train-ticket-reservation# ls
Dummy-Database.mvnc README.md screenshots WebContent pom.xml src
root@ip-172-31-55-255:~/train-ticket-reservation# mvn validate
[INFO] Scanning for projects...
[INFO]
[INFO] -----< TrainBook:TrainBook >-----
[INFO] Building TrainBook 1.0.0-SNAPSHOT
[INFO] -----[ war ]-----
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] -----[INFO] Total time: 0.119 s
[INFO] Finished at: 2024-06-25T06:45:52Z
[INFO] -----
root@ip-172-31-55-255:~/train-ticket-reservation#

```

i-054fc0d3fe7cd81e5 (manual-deployment)  
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255

**mvn compile**

```

root@ip-172-31-55-255:~/train-ticket-reservation# mvn compile
[INFO] Scanning for projects...
[INFO] -----
[INFO] Building TrainBook 1.0.0-SNAPSHOT
[INFO] -----
[INFO] [ war ]
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/2.6/maven-resources-plugin-2.6.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/2.6/maven-resources-plugin-2.6.pom (8.1 kB at 21 kB/s)
Download from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/23/maven-plugins-23.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/23/maven-plugins-23.pom (9.2 kB at 484 kB/s)
Download from central: https://repo.maven.apache.org/maven/plugins/maven-resources-plugin/2.6/maven-resources-plugin-2.6.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-resources-plugin/2.6/maven-resources-plugin-2.6.jar (30 kB at 843 kB/s)
Download from central: https://repo.maven.apache.org/maven2/org/postgresql/postgresql/42.3.7/postgresql-42.3.7.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/postgresql/postgresql/42.3.7/postgresql-42.3.7.jar (2.7 kB at 191 kB/s)
Download from central: https://repo.maven.apache.org/maven2/org/checkerframework/checker-qual/3.5.0/checker-qual-3.5.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/checkerframework/checker-qual/3.5.0/checker-qual-3.5.0.pom (2.2 kB at 180 kB/s)
Download from central: https://repo.maven.apache.org/maven2/mysql/mysql-connector-java/8.0.28/mysql-connector-java-8.0.28.pom
Downloaded from central: https://repo.maven.apache.org/maven2/mysql/mysql-connector-java/8.0.28/mysql-connector-java-8.0.28.pom (2.7 kB at 225 kB/s)
Download from central: https://repo.maven.apache.org/maven2/com/google/protobuf/protobuf-java/3.11.4/protobuf-java-3.11.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/com/google/protobuf/protobuf-java/3.11.4/protobuf-java-3.11.4.pom (5.6 kB at 464 kB/s)
Download from central: https://repo.maven.apache.org/maven2/com/google/protobuf/protobuf-parent/3.11.4/protobuf-parent-3.11.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/com/google/protobuf/protobuf-parent/3.11.4/protobuf-parent-3.11.4.pom (7.7 kB at 590 kB/s)
Download from central: https://repo.maven.apache.org/maven2/com/google/protobuf/protobuf-bom/3.11.4/protobuf-bom-3.11.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/com/google/protobuf/protobuf-bom/3.11.4/protobuf-bom-3.11.4.pom (3.5 kB at 354 kB/s)
Download from central: https://repo.maven.apache.org/maven2/javax/servlet/javax.servlet-api/3.1.0/javax.servlet-api-3.1.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/javax/servlet/javax.servlet-api/3.1.0/javax.servlet-api-3.1.0.pom (14 kB at 902 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/net/java/jvnet-parent/3/jvnet-parent-3.pom

```

i-054fc0d3fe7cd81e5 (manual-deployment)

PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255

## mvn package

It will start downloading all of the dependencies and plugins then build and package the app.

```

root@ip-172-31-55-255:~/train-ticket-reservation# mvn package
[INFO] Scanning for projects...
[INFO] -----
[INFO] Building TrainBook 1.0.0-SNAPSHOT
[INFO] -----
[INFO] [ war ]
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.pom (10 kB at 31 kB/s)
Download from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire/2.12.4/surefire-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire/2.12.4/surefire-2.12.4.pom (14 kB at 492 kB/s)
Download from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.3/maven-war-plugin-3.2.3.pom (9.6 kB at 686 kB/s)
Download from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.3/maven-war-plugin-3.2.3.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.3/maven-war-plugin-3.2.3.jar (91 kB at 3.0 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-dependency-plugin/2.3/maven-dependency-plugin-2.3.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-dependency-plugin/2.3/maven-dependency-plugin-2.3.pom (11 kB at 836 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/21/maven-plugins-21.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/21/maven-plugins-21.pom (12 kB at 892 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven-parent/20/maven-parent-20.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven-parent/20/maven-parent-20.pom (25 kB at 1.3 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-dependency-plugin/2.3/maven-dependency-plugin-2.3.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-dependency-plugin/2.3/maven-dependency-plugin-2.3.jar (132 kB at 3.1 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/checkerframework/checker-qual/3.5.0/checker-qual-3.5.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/checkerframework/checker-qual/3.5.0/checker-qual-3.5.0.jar (214 kB at 5.1 MB/s)

```

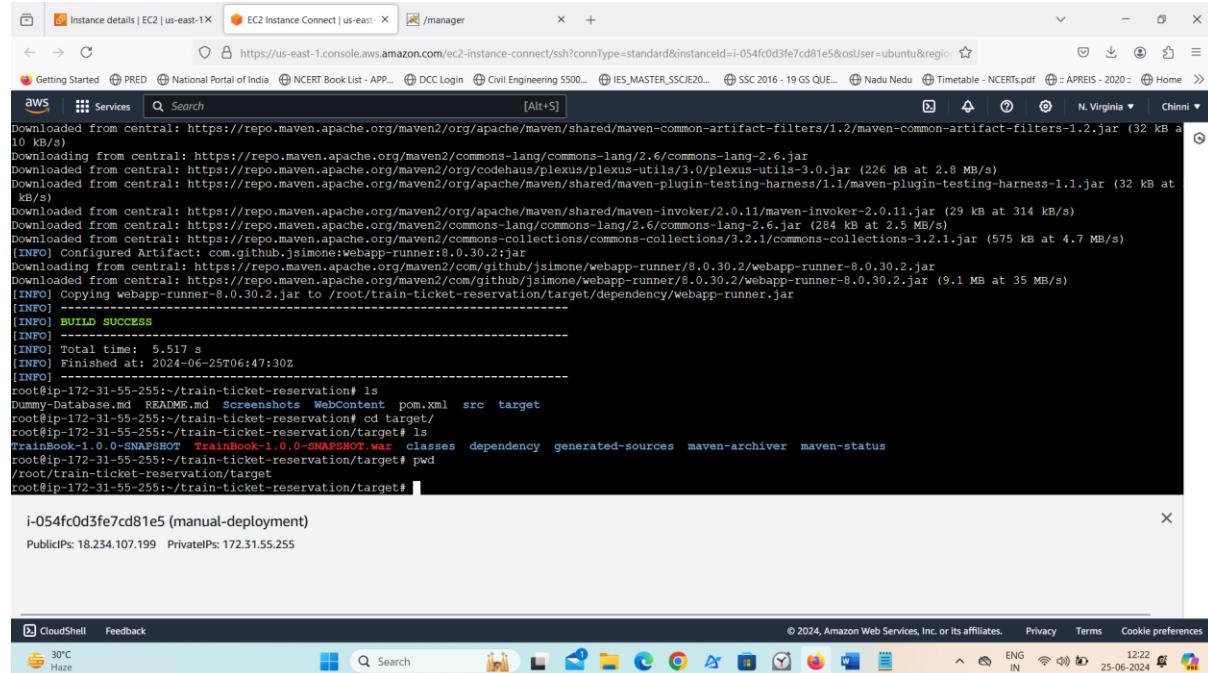
i-054fc0d3fe7cd81e5 (manual-deployment)

PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255

If you ls now, you should see the target folder.

cd into the target folder and if you ls again you will see the war file. This is the artifact that we need to copy into Tomcat.

type pwd so that we can get the source artifact path.

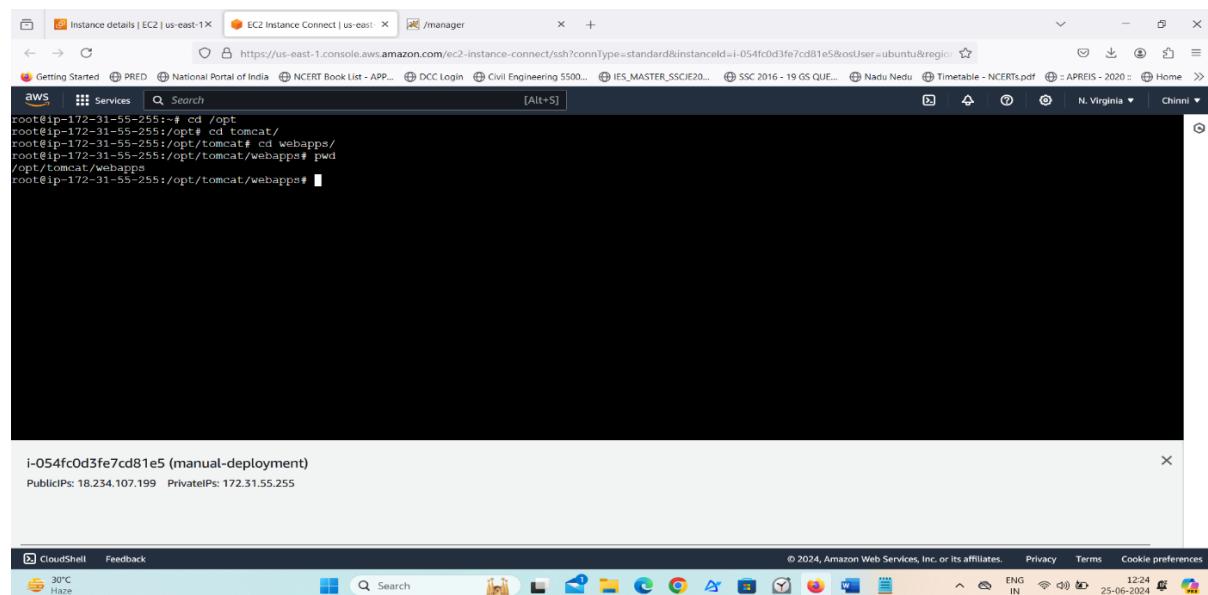


```
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-common-artifact-filters/1.2/maven-common-artifact-filters-1.2.jar (32 kB at 10 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/commons-lang/commons-lang/2.6/commons-lang-2.6.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.jar (226 kB at 2.8 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-plugin-testing-harness/1.1/maven-plugin-testing-harness-1.1.jar (32 kB at 8 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven/shared/maven-invoker/2.0.11/maven-invoker-2.0.11.jar (29 kB at 314 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/commons-lang/commons-lang-2.6.jar (284 kB at 2.5 MB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/commons-collections/commons-collections/3.2.1/commons-collections-3.2.1.jar (575 kB at 4.7 MB/s)
[INFO] Configured Artifact: com.github.jsimone:webapp-runner:8.0.30.2.jar
Downloaded from central: https://repo.maven.apache.org/github/jsimone/webapp-runner/8.0.30.2/webapp-runner-8.0.30.2.jar
[INFO] Copying webapp-runner-8.0.30.2.jar to /root/train-ticket-reservation/target/dependency/webapp-runner.jar
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 5.517 s
[INFO] Finished at: 2024-06-25T06:47:30Z
[INFO]
[INFO] -----
root@ip-172-31-55-255:~/train-ticket-reservation# ls
Dummy-Database.md README.md Screenshots WebContent pom.xml src target
root@ip-172-31-55-255:~/train-ticket-reservation# cd target/
root@ip-172-31-55-255:~/train-ticket-reservation/target# ls
TrainBook-1.0.0-SNAPSHOT TrainBook-1.0.0-SNAPSHOT.war classes dependency generated-sources maven-archiver maven-status
root@ip-172-31-55-255:~/train-ticket-reservation/target# pwd
/root/train-ticket-reservation/target
root@ip-172-31-55-255:~/train-ticket-reservation/target#
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255

Now we need to get the destination path for Tomcat. To make it easier we can open a new session then sudo su and follow these commands one by one:

- cd ~
- cd tomcat
- cd webapps
- pwd



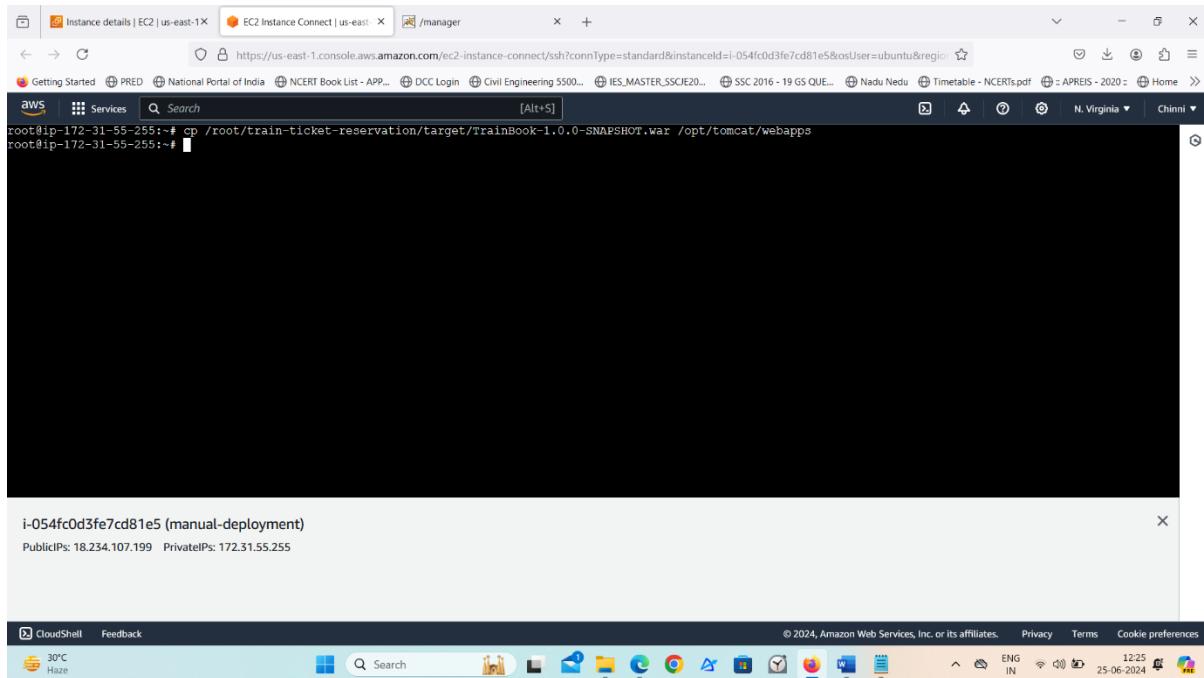
```
root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# cd tomcat/
root@ip-172-31-55-255:/opt/tomcat# cd webapps/
root@ip-172-31-55-255:/opt/tomcat/webapps# pwd
/opt/tomcat/webapps
root@ip-172-31-55-255:/opt/tomcat/webapps#
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255

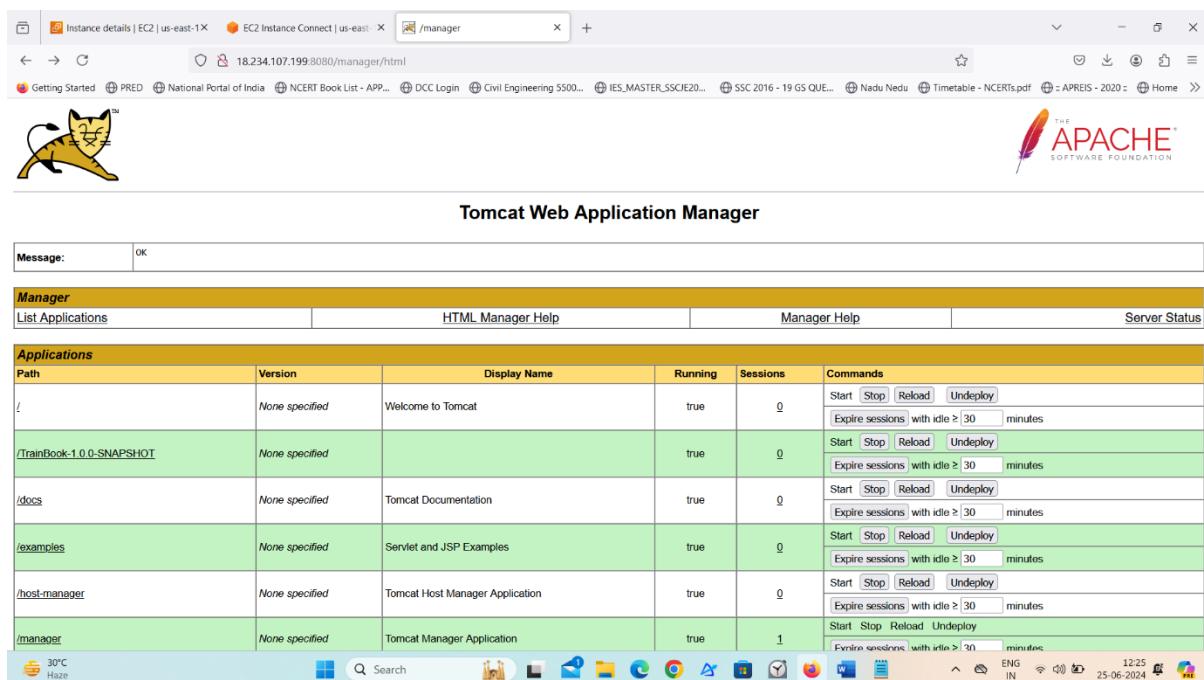
We now have the destination file path.

Let's copy the artifact into Tomcat by running:

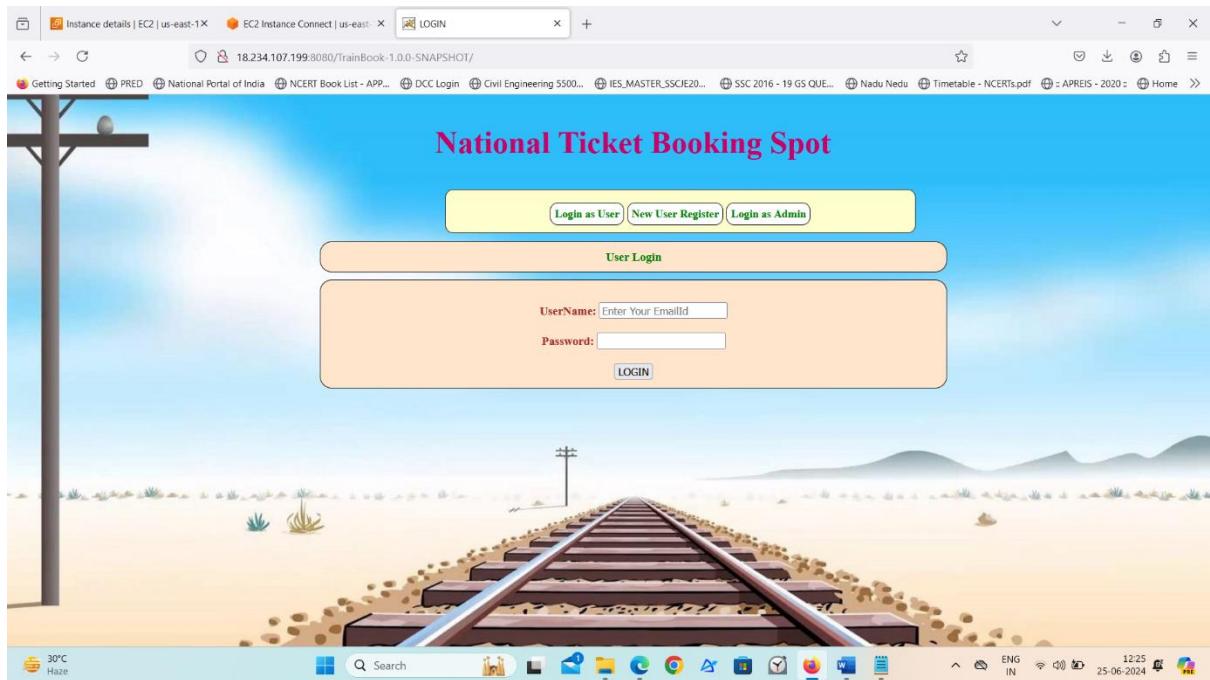
```
cp /root/tarin-ticket-reservation/target/TRAINBOOK-1.0.0-SNAPSHOT.war  
/opt/tomcat/webapps/
```



Now go to browser and refresh it we see TRAINBOOK-1.0.0-SNAPSHOT



Click on TRAINBOOK-1.0.0-SNAPSHOT we see that page is opened.



## Deploying the taxi booking application

Let's clone the repo where the app is located:

```
git clone https://github.com/vommidapuchinni/taxi-booking.git
```

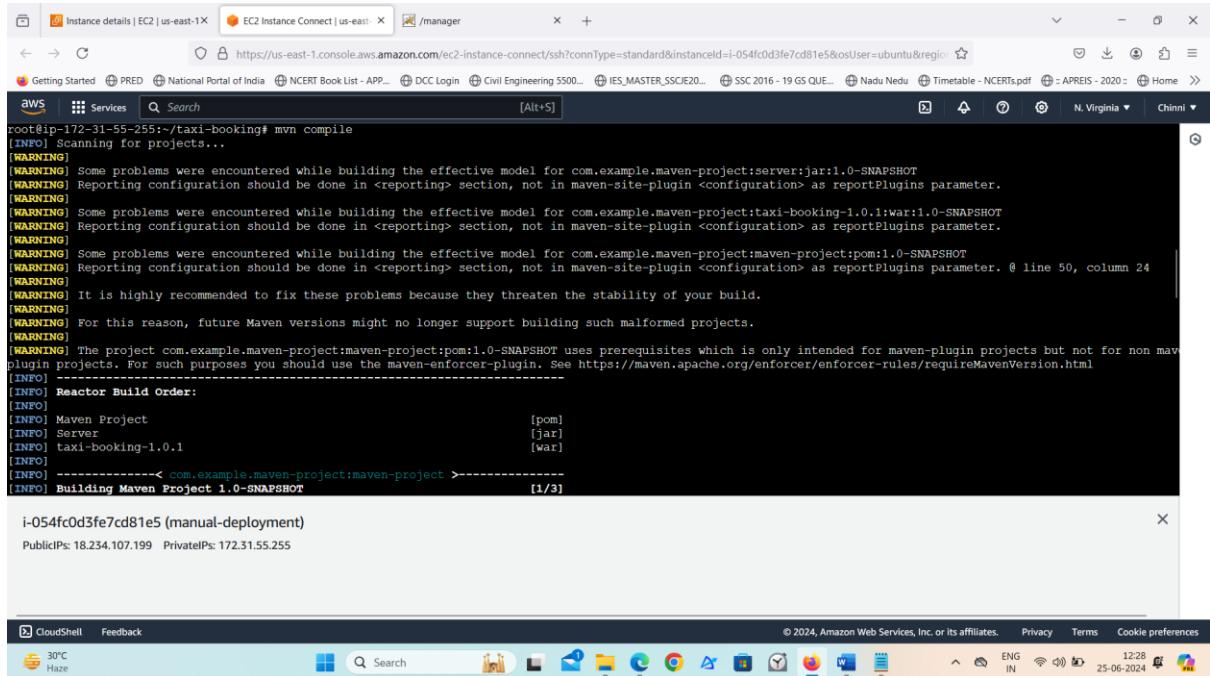
cd into taxi-booking and once the download finishes run:

```
mvn validate
```

```
root@ip-172-31-55-255:~# git clone https://github.com/vommidapuchinni/taxi-booking.git
cloning into 'taxi-booking'...
remote: Enumerating objects: 205, done.
remote: Counting objects: 100% (34/34), done.
remote: Compressing objects: 100% (27/27), done.
remote: Total 205 (delta 27), reused 7 (delta 7), pack-reused 171
Receiving objects: 100% (205/205), 10.14 MiB | 51.16 MiB/s, done.
Resolving deltas: 100% (53/53), done.
root@ip-172-31-55-255:~# cd taxi-booking/
root@ip-172-31-55-255:/taxi-booking# ls
pom.xml  Jenkinsfile  README.md  deployment.yaml  pom.xml  server  taxi-booking
root@ip-172-31-55-255:/taxi-booking# mvn validate
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:taxi-booking-1.0.1:war:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:pom:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter. @ line 50, column 24
[WARNING]
[WARNING] It is highly recommended to fix these problems because they threaten the stability of your build.
[WARNING]
[WARNING] For this reason, future Maven versions might no longer support building such malformed projects.
[WARNING]

i-054fc0d3fe7cd81e5 (manual-deployment)
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255
```

## mvn compile

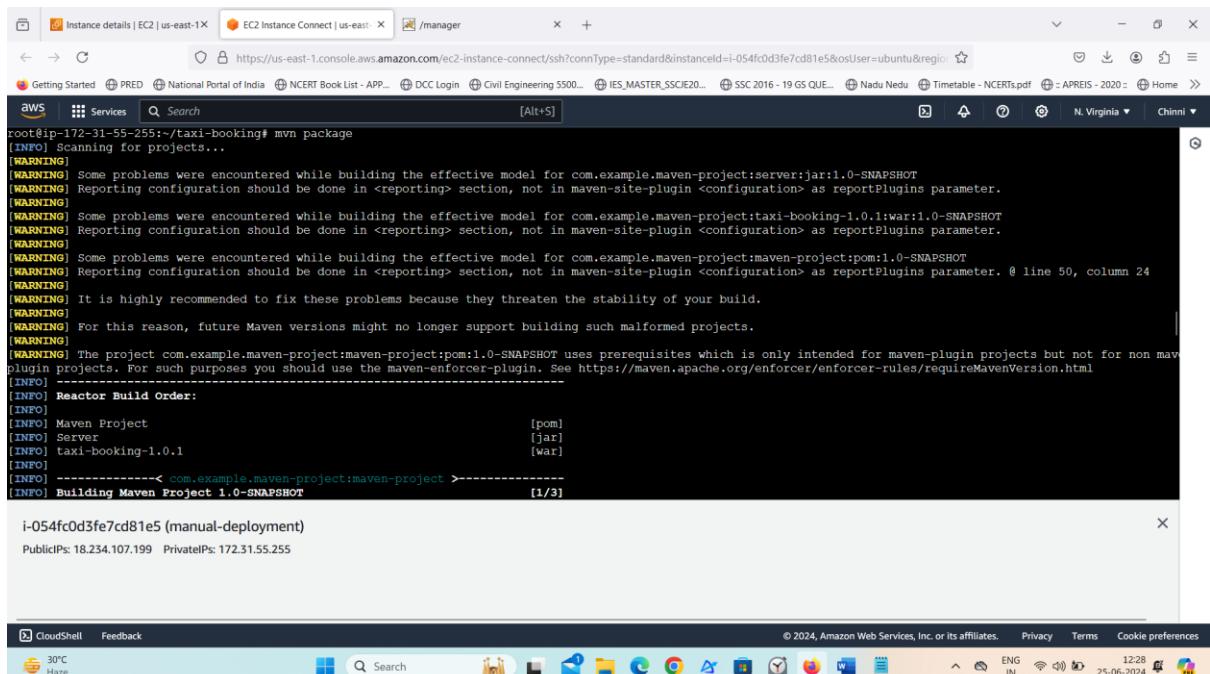


```
root@ip-172-31-55-255:/taxi-booking# mvn compile
[INFO] Scanning for projects...
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:taxi-booking-1.0.1:war:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:maven-project:pom:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter. @ line 50, column 24
[WARNING] It is highly recommended to fix these problems because they threaten the stability of your build.
[WARNING] For this reason, future Maven versions might no longer support building such malformed projects.
[WARNING] The project com.example.maven-project:maven-project:pom:1.0-SNAPSHOT uses prerequisites which is only intended for maven-plugin projects but not for non maven plugin projects. For such purposes you should use the maven-enforcer-plugin. See https://maven.apache.org/enforcer/enforcer-rules/requireMavenVersion.html
[INFO] -----
[INFO] Reactor Build Order:
[INFO]
[INFO] Maven Project              [pom]
[INFO] Server                      [jar]
[INFO] taxi-booking-1.0.1          [war]
[INFO]
[INFO] -----< com.example.maven-project:maven-project >-----
[INFO] Building Maven Project 1.0-SNAPSHOT   [1/3]

i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```

## mvn package

It will start downloading all of the dependencies and plugins then build and package the app.



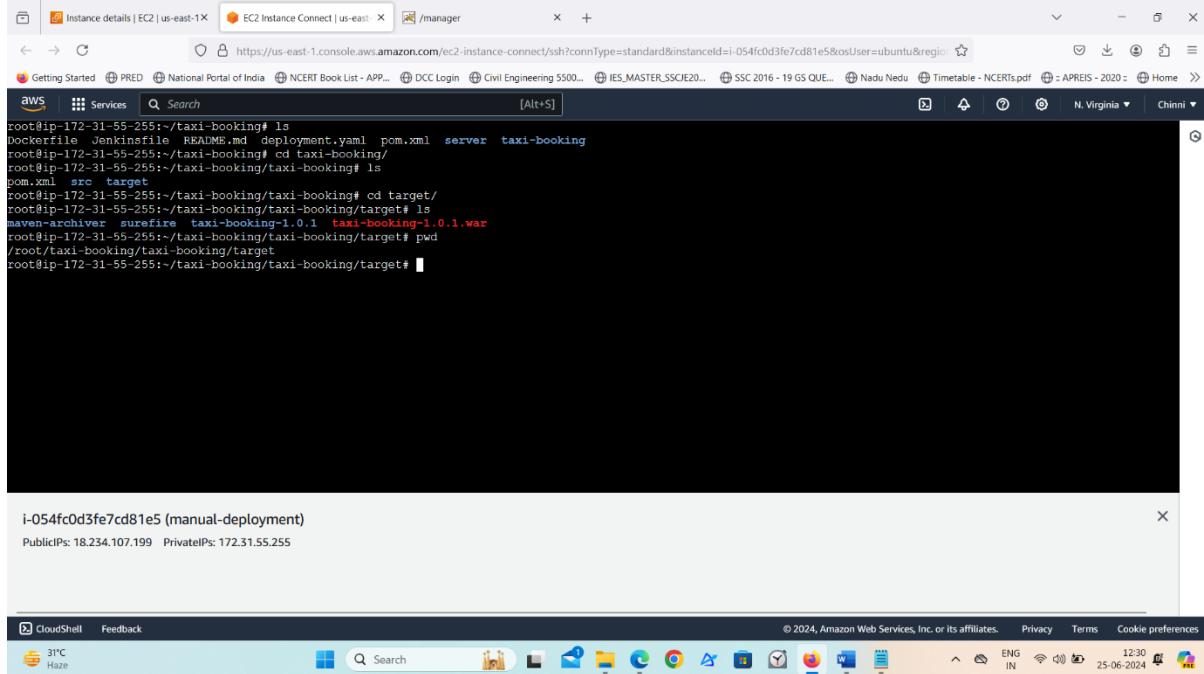
```
root@ip-172-31-55-255:/taxi-booking# mvn package
[INFO] Scanning for projects...
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:taxi-booking-1.0.1:war:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:maven-project:pom:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter. @ line 50, column 24
[WARNING] It is highly recommended to fix these problems because they threaten the stability of your build.
[WARNING] For this reason, future Maven versions might no longer support building such malformed projects.
[WARNING] The project com.example.maven-project:maven-project:pom:1.0-SNAPSHOT uses prerequisites which is only intended for maven-plugin projects but not for non maven plugin projects. For such purposes you should use the maven-enforcer-plugin. See https://maven.apache.org/enforcer/enforcer-rules/requireMavenVersion.html
[INFO] -----
[INFO] Reactor Build Order:
[INFO]
[INFO] Maven Project              [pom]
[INFO] Server                      [jar]
[INFO] taxi-booking-1.0.1          [war]
[INFO]
[INFO] -----< com.example.maven-project:maven-project >-----
[INFO] Building Maven Project 1.0-SNAPSHOT   [1/3]

i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```

If you ls now, you should see the target folder.

cd into the target folder and if you ls again you will see the war file. This is the artifact that we need to copy into Tomcat.

type pwd so that we can get the source artifact path.



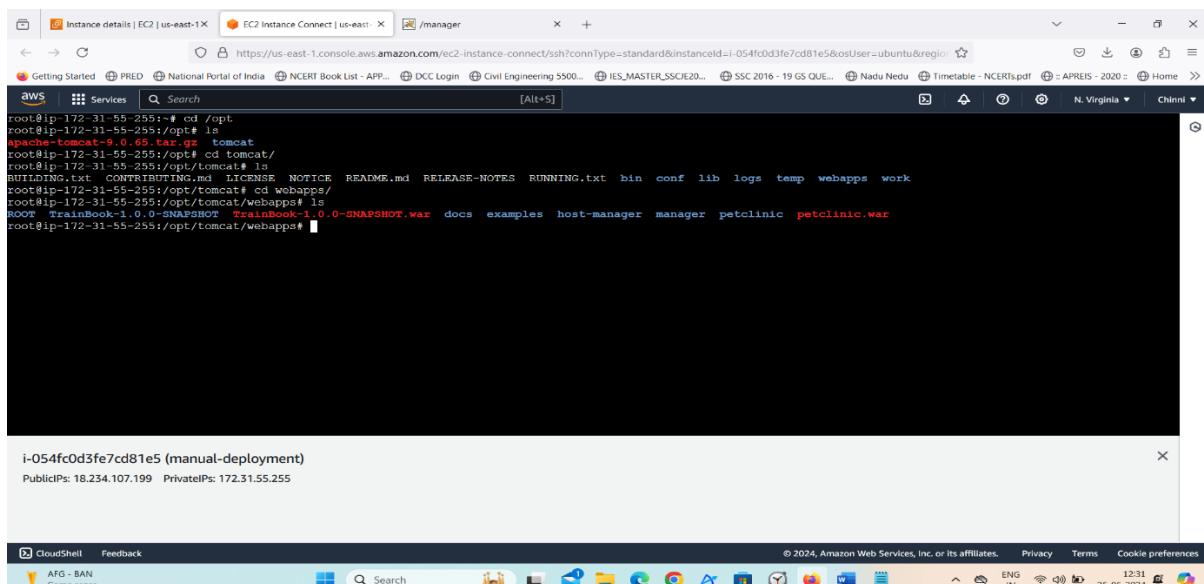
```
aws$ Services Search [Alt+S]
root@ip-172-31-55-255:~/taxi-booking# ls
Dockerfile Jenkinsfile README.md deployment.yaml pom.xml server taxi-booking
root@ip-172-31-55-255:~/taxi-booking# cd taxi-booking/
root@ip-172-31-55-255:~/taxi-booking/taxi-booking# ls
pom.xml src target
root@ip-172-31-55-255:~/taxi-booking/taxi-booking# cd target/
root@ip-172-31-55-255:~/taxi-booking/taxi-booking/target# ls
mvnarchiver
root@ip-172-31-55-255:~/taxi-booking/taxi-booking/target# pwd
/zoot/taxi-booking/taxi-booking/target
root@ip-172-31-55-255:~/taxi-booking/taxi-booking/target# ls
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255

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31°C Haze 12:30 25-06-2024 ENG IN

Now we need to get the destination path for Tomcat. To make it easier we can open a new session then sudo su and follow these commands one by one:

- cd ~
- cd tomcat
- cd webapps
- pwd



```
aws$ Services Search [Alt+S]
root@ip-172-31-55-255:~# cd /opt
root@ip-172-31-55-255:/opt# cd apache-tomcat-9.0.65/bin
root@ip-172-31-55-255:/opt/apache-tomcat-9.0.65/bin# ./shutdown.sh
root@ip-172-31-55-255:/opt/apache-tomcat-9.0.65/bin# cd ..
root@ip-172-31-55-255:/opt# cd tomcat/
root@ip-172-31-55-255:/opt/tomcat# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
root@ip-172-31-55-255:/opt/tomcat# cd webapps/
root@ip-172-31-55-255:/opt/tomcat/webapps# ls
ROOT trainBook-1.0.0-SNAPSHOT.war docs examples host-manager manager petclinic petclinic.war
root@ip-172-31-55-255:/opt/tomcat/webapps#
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
Public IPs: 18.234.107.199 Private IPs: 172.31.55.255

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AFG - BAN Game score 12:31 25-06-2024 ENG IN

We now have the destination file path.

Let's copy the artifact into Tomcat by running:

```
cp /root/taxi-booking/target/taxi-booking-1.0.1.war /opt/tomcat/webapps/
```

now go to browser, refresh it we see the taxi-booking-1.0.1

The screenshot shows the Apache Tomcat Web Application Manager interface. At the top, there is a banner with the Apache Software Foundation logo. Below the banner, the title "Tomcat Web Application Manager" is displayed. A message box indicates "OK - Undeployed application at context path [/TrainBook-1.0.0-SNAPSHOT]". The main content area is a table titled "Applications" with columns: Path, Version, Display Name, Running, Sessions, and Commands. The table lists several applications, including "/", "/docs", "/examples", "/host-manager", "/manager", and "/taxi-booking-1.0.1". The "/taxi-booking-1.0.1" entry has a green background, indicating it is currently deployed. The "Commands" column for this entry contains buttons for Start, Stop, Reload, and Undeploy, along with a link to "Expire sessions with idle ≥ 30 minutes". The bottom of the window shows a taskbar with various icons and system status information.

Click on taxi-booking-1.0.1 we see the page is opened.

The screenshot shows a web browser displaying the homepage of the "TAXI GRABBER" application. The header includes links for "HOME", "SERVICES", "DRIVERS", "CARS", "GARAGE", "LOCATIONS", and "PAGES". The main content features a large yellow phone number "8121-416-416" and a button labeled "READ MORE ABOUT US". The bottom of the window shows a taskbar with various icons and system status information.

## Deploying the React.js application

React.js is a JavaScript library for building user interfaces, developed by Facebook. It allows developers to create reusable UI components that efficiently render data changes and manage the application's state, focusing on component-based architecture and declarative views.

Install Node and NPM using nvm

- Install node version manager (nvm) by typing the following at the command line.
- curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.39.5/install.sh | bash
- We will use nvm to install Node.js because nvm can install multiple versions of Node.js and allow you to switch between them.
- Activate nvm by typing the following at the command line.
- . ~/.nvm/nvm.sh
- Use nvm 16.0.0 which is a supported and stable version
- nvm install 16.0.0
- Installing Node.js also installs the Node Package Manager (npm), so you can install additional modules as needed.
- Test that Node.js is installed and running correctly by typing the following at the command line.
- node -e "console.log('Running Node.js ' + process.version)"

The screenshot shows a CloudShell terminal window on an AWS EC2 instance. The terminal output is as follows:

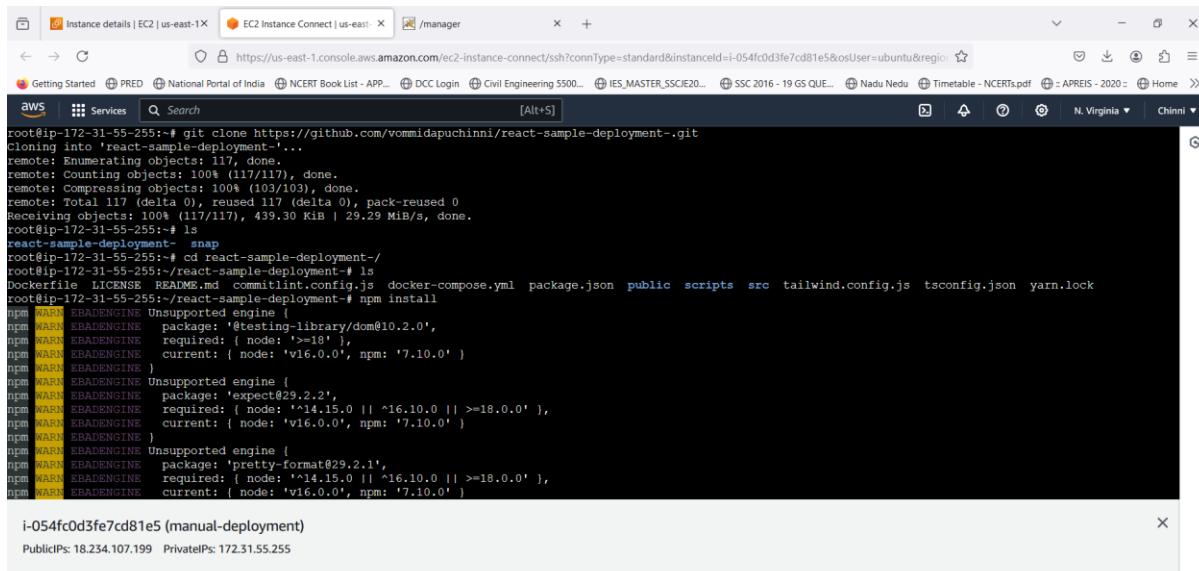
```
curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.39.5/install.sh | bash
  % Total    % Received % Xferd  Average Speed   Time     Time  Current
          Dload  Upload Total   Spent    Left Speed
100 15916  100 15916    0     0  135k      0 --:--:--:--:--:-- 135k
--> nvm is already installed in /root/.nvm, trying to update using git
--> Compressing and cleaning up git repository
--> nvm source string already in /root/.bashrc
--> bash_completion source string already in /root/.bashrc
--> Close and reopen your terminal to start using nvm or run the following to use it now:

export NVM_DIR="$HOME/.nvm"
[ -s "$NVM_DIR/nvm.sh" ] && \. "$NVM_DIR/nvm.sh" # This loads nvm
[ -s "$NVM_DIR/bash_completion" ] && \. "$NVM_DIR/bash_completion" # This loads nvm bash_completion
root@ip-172-31-55-255:~# . ~/.nvm/nvm.sh
root@ip-172-31-55-255:~# nvm install 16.0.0
Downloading and installing node v16.0.0...
Downloaded https://nodejs.org/dist/v16.0.0/node-v16.0.0-linux-x64.tar.xz...
computing checksum with sha256sum
Checksums matched!
Now using node v16.0.0 (npm v7.10.0)
Creating default alias: default -> v16.0.0
root@ip-172-31-55-255:~# node -e "console.log('Running Node.js ' + process.version)"
Running Node.js v16.0.0
root@ip-172-31-55-255:~#
```

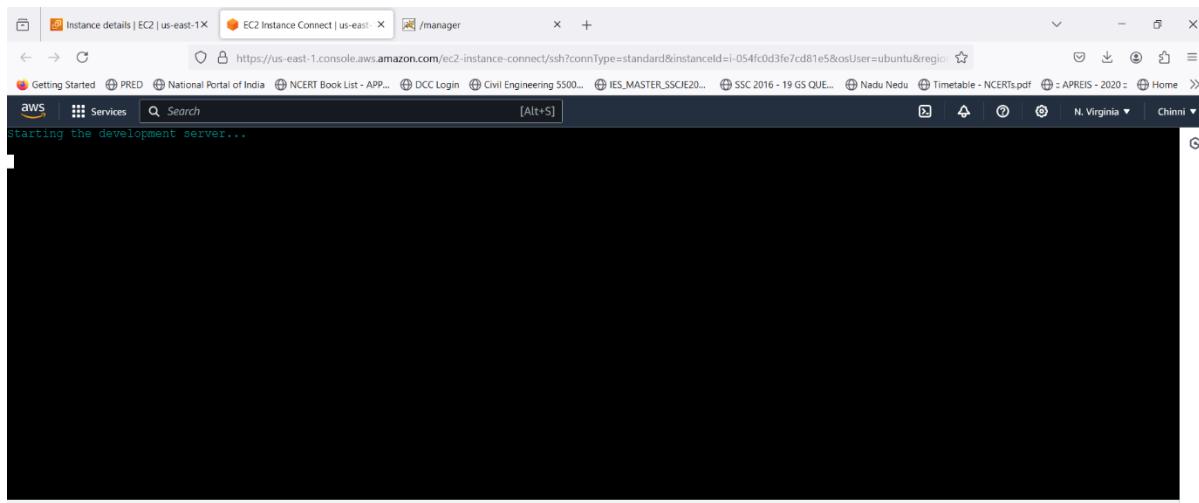
At the bottom of the terminal, a message indicates the deployment ID: i-054fc0d3fe7cd81e5 (manual-deployment). The status bar at the bottom right shows the date and time as 25-06-2024 12:48.

Clone the ReactJS app repository (replace the GitHub URL with your actual repository). Here we have taken the open source react app from the GitHub

- Move into the cloned directory:
- This ensures you have the latest version of your ReactJS app on your EC2 instance. Now, proceed to build and deploy the app.
- Install all the required dependencies
- To install the dependencies use the below command:
- `npm install`



```
root@ip-172-31-55-255:~# git clone https://github.com/vommidapuchinni/react-sample-deployment-.git
Cloning into 'react-sample-deployment-'...
remote: Enumerating objects: 117, done.
remote: Counting objects: 100% (117/117), done.
remote: Compressing objects: 100% (103/103), done.
remote: Total 117 (delta 0), reused 117 (delta 0), pack-reused 0
Receiving objects: 100% (117/117), 439.30 KiB | 29.29 MiB/s, done.
root@ip-172-31-55-255:~# ls
react-sample-deployment snap
root@ip-172-31-55-255:~# cd react-sample-deployment/
root@ip-172-31-55-255:~/react-sample-deployment# ls
Dockerfile LICENSE README.md commitlint.config.js docker-compose.yml package.json public scripts src tailwind.config.js tsconfig.json yarn.lock
root@ip-172-31-55-255:~/react-sample-deployment# npm install
npm WARN EBADENGINE Unsupported engine {
npm WARN EBADENGINE   package: '@testing-library/dom@10.2.0',
npm WARN EBADENGINE   required: { node: '>=18' },
npm WARN EBADENGINE   current: { node: 'v16.0.0', npm: '7.10.0' }
npm WARN EBADENGINE )
npm WARN EBADENGINE Unsupported engine {
npm WARN EBADENGINE   package: 'expect@29.2.2',
npm WARN EBADENGINE   required: { node: '^14.15.0 || ^16.10.0 || >=18.0.0' },
npm WARN EBADENGINE   current: { node: 'v16.0.0', npm: '7.10.0' }
npm WARN EBADENGINE )
npm WARN EBADENGINE Unsupported engine {
npm WARN EBADENGINE   package: 'pretty-format@29.2.1',
npm WARN EBADENGINE   required: { node: '^14.15.0 || ^16.10.0 || >=18.0.0' },
npm WARN EBADENGINE   current: { node: 'v16.0.0', npm: '7.10.0' }
}
i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```



```
starting the development server...
```

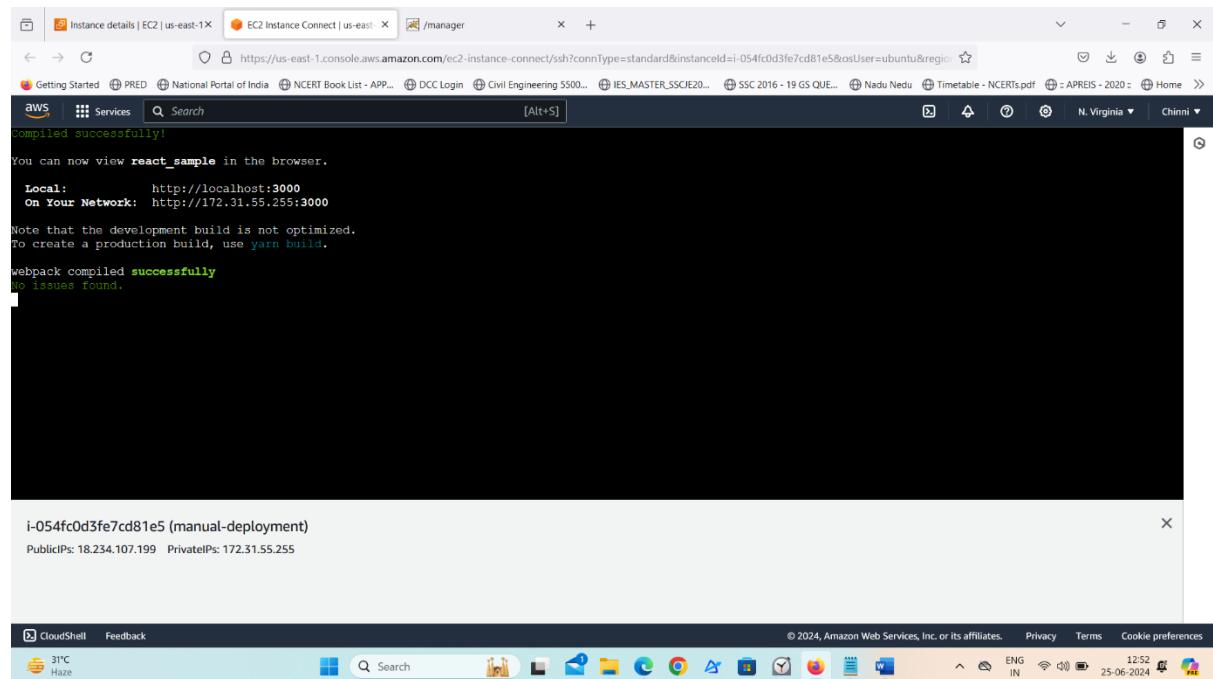


From the above output, we've successfully installed the npm packages for your project. However, there are some warnings and vulnerabilities reported which we can ignore at the moment for this demo.

## Run the application

To run the application put the below command

```
npm start
```



```
Compiled successfully!
You can now view react_sample in the browser.
Local: http://localhost:3000
On Your Network: http://172.31.55.255:3000
Note that the development build is not optimized.
To create a production build, use yarn build.
webpack compiled successfully
no issues found.
```

i-054fc0d3fe7cd81e5 (manual-deployment)  
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255

## Using PM2 to Run and Manage React Apps

Running a React app using pm2 offers several advantages, especially in a production environment. PM2 acts as a process manager for React.js applications, ensuring they run persistently, can be easily monitored, and automatically restart in case of failures. Here's a step-by-step guide on why and how to use PM2 with a React app:

Install PM2 Globally:

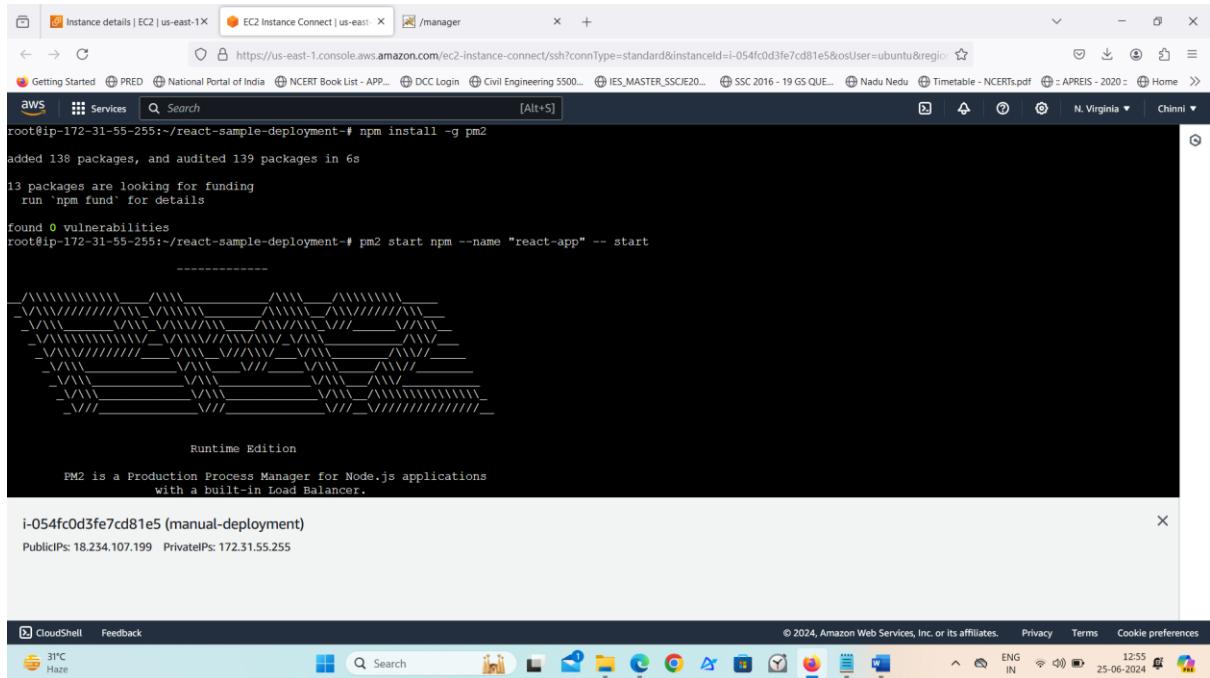
Open a terminal and install PM2 globally using the following command:

```
npm install -g pm2
```

Start Your React App with PM2:

Use the following command to start your React app using PM2:

```
pm2 start npm --name "react-app" -- start
```



The screenshot shows a terminal window titled 'EC2 Instance Connect | us-east-1' connected via SSH. The command 'pm2 start npm --name "react-app" -- start' is being run. The output shows the installation of PM2 and its successful startup. A decorative PM2 logo consisting of many diagonal lines is displayed. Below the logo, the text 'Runtime Edition' and 'PM2 is a Production Process Manager for Node.js applications with a built-in Load Balancer.' is visible.

```
root@ip-172-31-55-255:~/react-sample-deployment# npm install -g pm2
added 138 packages, and audited 139 packages in 6s
13 packages are looking for funding
  run 'npm fund' for details
found 0 vulnerabilities
root@ip-172-31-55-255:~/react-sample-deployment# pm2 start npm --name "react-app" -- start
-----

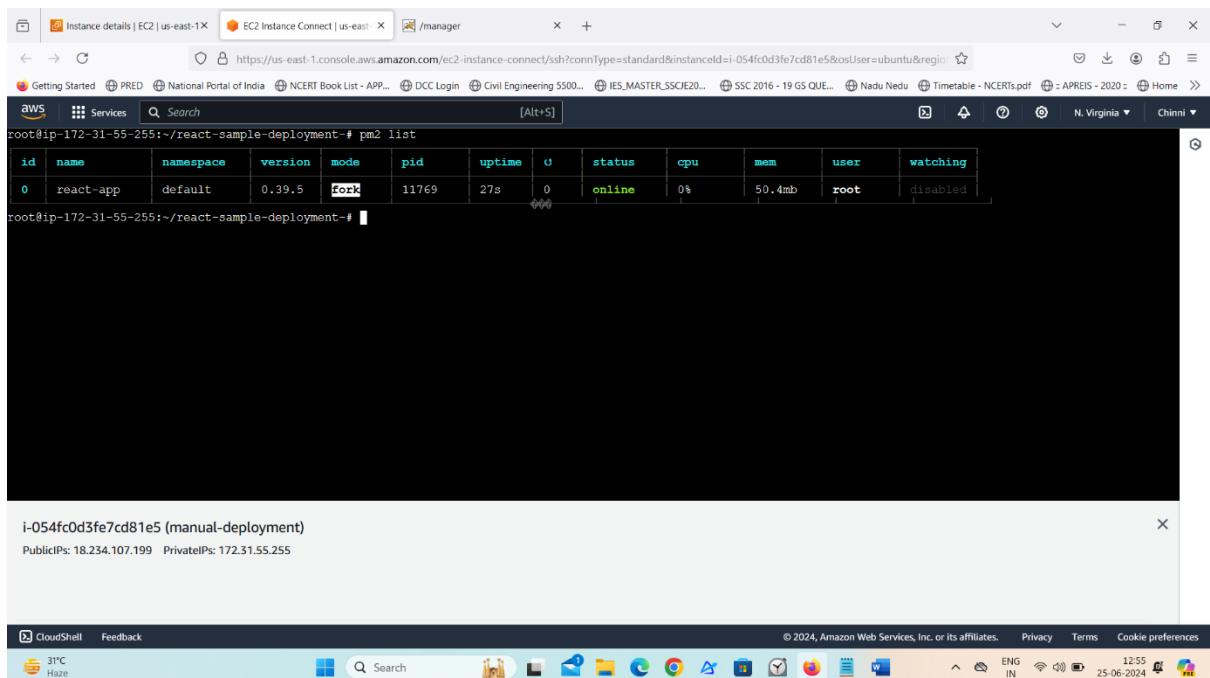
Runtime Edition
PM2 is a Production Process Manager for Node.js applications
with a built-in Load Balancer.

i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```

View Process Status:

Check the status of your running processes to ensure your React app is listed:

```
pm2 list
```



The screenshot shows a terminal window titled 'EC2 Instance Connect | us-east-1' connected via SSH. The command 'pm2 list' is run, displaying a table of running processes. One process, 'react-app', is listed with a status of 'online'. The table includes columns for id, name, namespace, version, mode, pid, uptime, status, cpu, mem, user, and watching.

id	name	namespace	version	mode	pid	uptime	status	cpu	mem	user	watching	
0	react-app	default	0.39.5	fork	11769	27s	0	online	0%	50.4mb	root	disabled

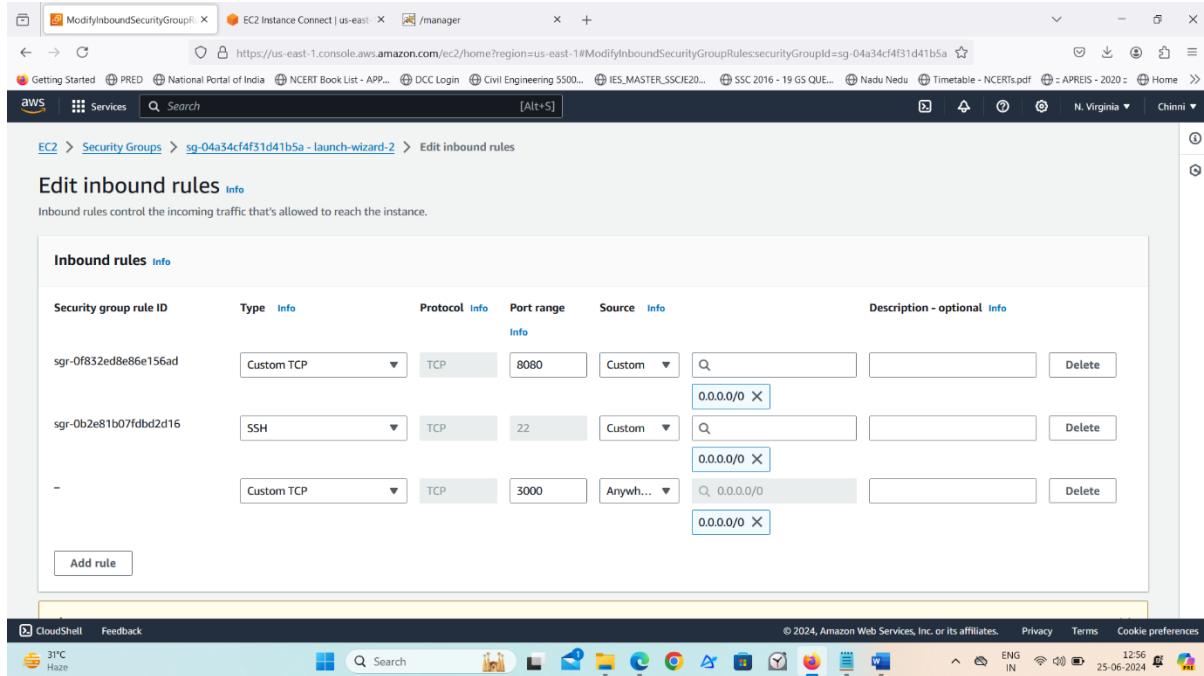
```
root@ip-172-31-55-255:~/react-sample-deployment# pm2 list


| id | name      | namespace | version | mode | pid   | uptime | status | cpu    | mem | user   | watching |          |
|----|-----------|-----------|---------|------|-------|--------|--------|--------|-----|--------|----------|----------|
| 0  | react-app | default   | 0.39.5  | fork | 11769 | 27s    | 0      | online | 0%  | 50.4mb | root     | disabled |


i-054fc0d3fe7cd81e5 (manual-deployment)
PublicIPs: 18.234.107.199 PrivateIPs: 172.31.55.255
```

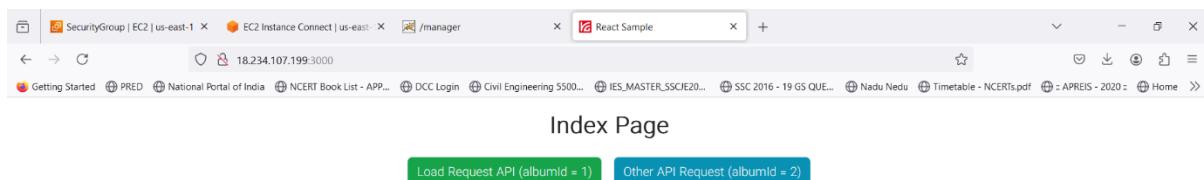
## Accessing Your React App from the Browser

Before this, you need to make sure that in the Security group of your EC2 Instance, port 3000 is allowed in the inbound rules:



The screenshot shows the AWS CloudShell interface with the AWS Management Console open. The user is in the EC2 service, specifically editing inbound rules for a security group. A rule for port 3000 is selected, showing its configuration: Type: Custom TCP, Port range: 3000, Source: Anywhere (0.0.0.0/0). Other rules listed include a Custom TCP rule for port 8080 and an SSH rule for port 22.

- Access the App:
- Open your web browser and take the public IP of your EC2 Instance with port 3000:
- <http://public-ip:3000>



The screenshot shows a web browser displaying a React application titled "React Sample". The page content is titled "Index Page" and contains two buttons: "Load Request API (albumId = 1)" and "Other API Request (albumId = 2)". The browser's address bar shows the URL "18.234.107.199:3000". The browser interface includes a toolbar with various icons and a status bar at the bottom.



- Additional PM2 Commands (Optional):
- Stop the Process (if needed):
- If you need to stop your React app, you can use:
- pm2 stop react-app
- To manually restart your React app, use:
- pm2 restart your-app-name
- By following these steps, you ensure your React app runs persistently, benefits from automatic restarts, and is easily managed with PM2.

## Deploying the Node.js application

Node.js is a runtime environment that allows you to run JavaScript code outside of a web browser. It is built on the V8 JavaScript engine, which is the same engine that powers Google Chrome. Node.js enables you to execute JavaScript on the server-side, making it possible to build web applications, APIs, and other types of software using JavaScript.

Deploying a Node.js Application on AWS means putting your web app on a super reliable and fast platform. It's like giving your app a strong backbone. It can handle lots of users without slowing down.

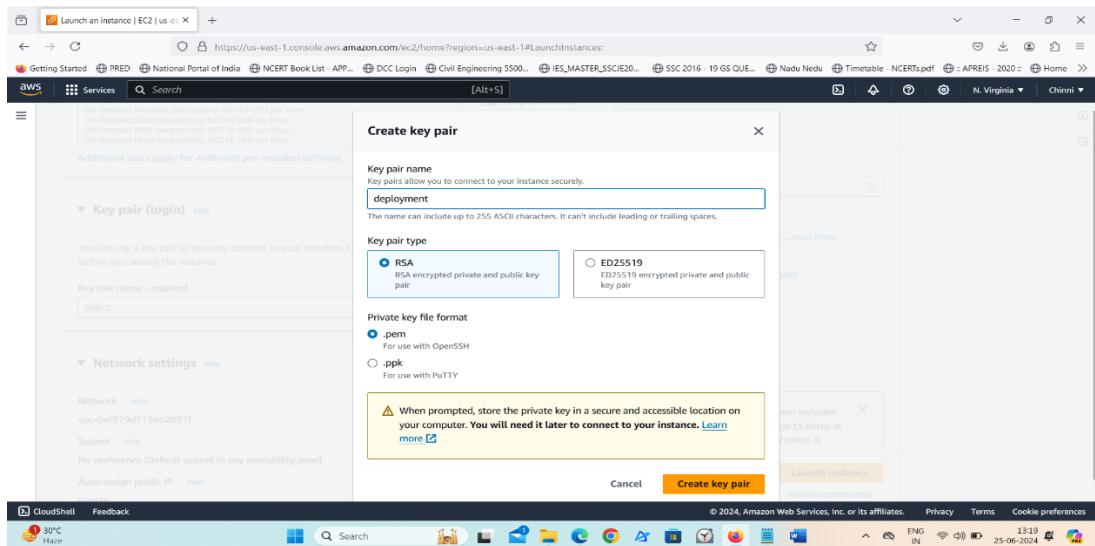
AWS also gives you handy tools to make deploying and managing your app easier. This way, you can spend more time making your app cool and less time worrying about technical stuff. So, using AWS for deployment helps make your web app strong, reliable, and ready for anything.

**Express:** Express is a web application framework for Node.js. It provides a robust set of features to help you build web applications and APIs quickly and efficiently.

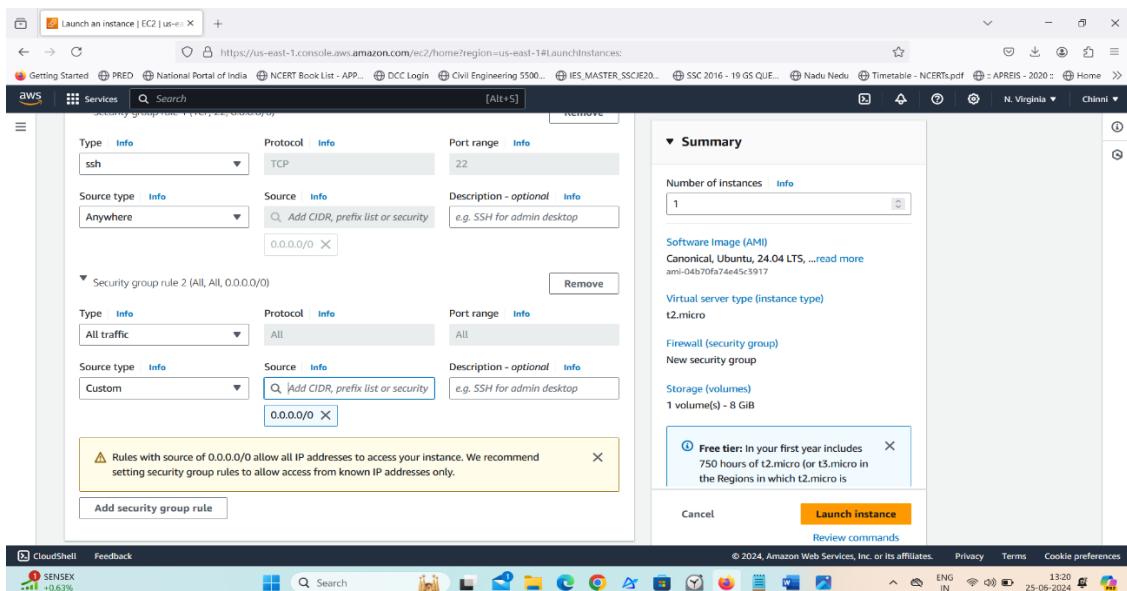
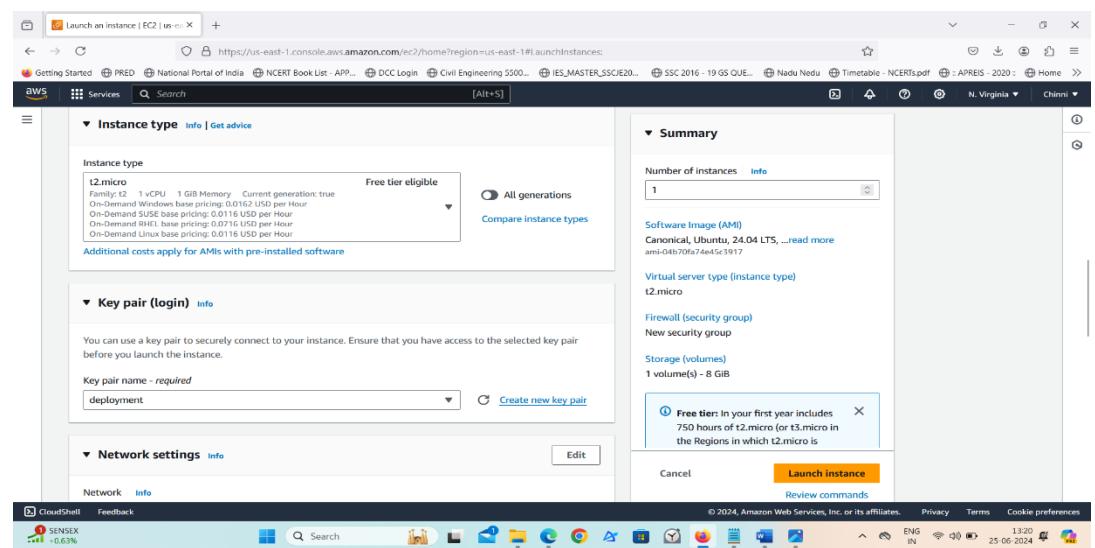
Launch an instance. Give tag/name for it.

## Select AMI as ubuntu.

## Create a new key pair.



## Select instance type.



## Connect to the instance.

The screenshot shows the AWS EC2 Instances page with the instance summary for i-04d999aa9c4140e12. Key details include:

- Instance ID: i-04d999aa9c4140e12 (nodejs-deployment)
- Public IPv4 address: 44.210.118.25
- Private IP DNS name (IPv4 only): ip-172-31-89-56.ec2.internal
- Instance type: t2.micro
- VPC ID: vpc-0ef979d7194b2891f
- Subnet ID: subnet-09d3a61c249be9d3
- Instance ARN: arnaws:ec2:us-east-1:891377277875:instance/

The sidebar shows various EC2 services like Dashboard, Global View, Events, Instances, Images, and Elastic Block Store.

The screenshot shows the "Connect to instance" page for instance i-04d999aa9c4140e12. It provides options for connecting:

- EC2 Instance Connect:** Selected option, using a browser-based client with a public IPv4 address.
- Session Manager:** Option for using the Session Manager.
- SSH client:** Option for using an SSH client.
- EC2 serial console:** Option for using the EC2 Serial Console.

Connection details:  
Instance ID: i-04d999aa9c4140e12 (nodejs-deployment)  
Connection Type: EC2 Instance Connect  
Public IP address: 44.210.118.25  
Username: ubuntu

**Note:** In most cases, the default username, ubuntu, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

The screenshot shows a terminal session connected to the instance. The session output includes:

```
Memory usage: 21%          IPv4 address for enx0: 172.31.89.56
Swap usage: 0%
Expanded Security Maintenance for Applications is not enabled.
0 updates can be applied immediately.
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

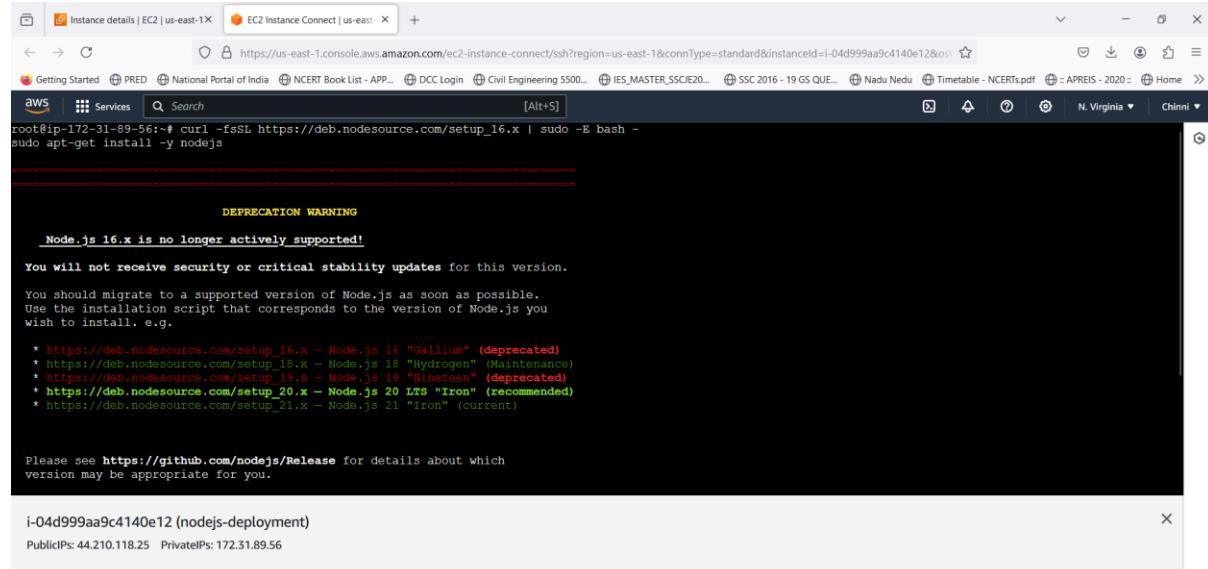
ubuntu@ip-172-31-89-56:~$ sudo apt update -y
i-04d999aa9c4140e12 (nodejs-deployment)
PublicIPs: 44.210.118.25 PrivateIPs: 172.31.89.56
```

Update the server using apt update -y

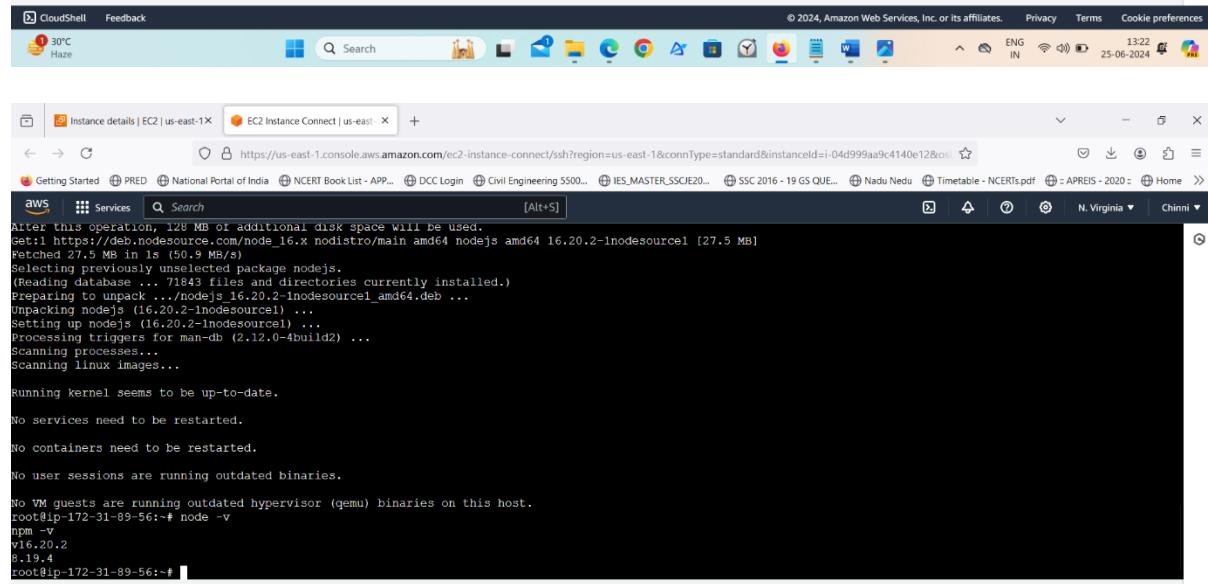
Proceed to install node on your AWS EC2 instances with the following commands:

```
curl -fsSL https://deb.nodesource.com/setup_16.x | sudo -E bash -
```

```
sudo apt-get install -y nodejs && node -v
```



The screenshot shows a CloudShell terminal window titled "Instance details | EC2 | us-east-1" with the URL "https://us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh?region=us-east-1&connType=standard&instanceId=i-04d999aa9c4140e12&os=Linux". The terminal output shows the command "curl -fsSL https://deb.nodesource.com/setup\_16.x | sudo -E bash -" being run, followed by a "DEPRECATION WARNING" message from Node.js 16.x stating it is no longer actively supported. It lists recommended LTS versions (18, 20, 22) and provides a link to GitHub for more details. Below this, the command "sudo apt-get install -y nodejs && node -v" is shown.



The screenshot shows a CloudShell terminal window titled "Instance details | EC2 | us-east-1" with the URL "https://us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh?region=us-east-1&connType=standard&instanceId=i-04d999aa9c4140e12&os=Linux". The terminal output shows the "apt-get" command installing nodejs. It includes a warning about additional disk space usage (128 MB), the download of the node\_16.x\_nodistro\_main\_amd64.deb package (27.5 MB), and the unpacking and configuration of the package. It also shows the running of triggers for man-db and the scanning of processes and Linux images. The output ends with the command "node -v" showing the version v16.20.2.



The screenshot shows a CloudShell terminal window titled "Instance details | EC2 | us-east-1" with the URL "https://us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh?region=us-east-1&connType=standard&instanceId=i-04d999aa9c4140e12&os=Linux". The terminal output shows the command "node -v" being run again, confirming the installed version is v16.20.2.

Clone the repository: npm install

Instance details | EC2 | us-east-1 X EC2 Instance Connect | us-east-1 X

```
root@ip-172-31-89-56:~# git clone https://github.com/vommidaupuchinni/Dating-App-node.js.git
Cloning into 'Dating-App-node.js'...
remote: Enumerating objects: 499, done.
remote: Counting objects: 100% (499/499), done.
remote: Compressing objects: 100% (380/380), done.
remote: Total 499 (delta 93), reused 499 (delta 93), pack-reused 0
Receiving objects: 100% (499/499), 12.73 MiB / 33.53 MiB/s, done.
Resolving deltas: 100% (93/93), done.
root@ip-172-31-89-56:~# ls
Dating-App-node.js
root@ip-172-31-89-56:~/Dating-App-node.js#
root@ip-172-31-89-56:~/Dating-App-node.js# ls
index.html index.js node_modules package-lock.json package.json tools
root@ip-172-31-89-56:~/Dating-App-node.js# npm install
added 64 packages, and audited 67 packages in 3s

14 packages are looking for funding
  run 'npm fund' for details

found 0 vulnerabilities
npm notice
npm notice New major version of npm available! 0.19.4 => 10.0.1
npm notice Changelog: https://github.com/npm/cli/releases/tag/v10.0.1
npm notice Run `npm install -g npm@10.0.1` to update!
npm notice
root@ip-172-31-89-56:~/Dating-App-node.js# 
```

i-04d999aa9c4140e12 (nodejs-deployment)  
PublicIPs: 44.210.118.25 PrivateIPs: 172.31.89.56

sudo npm install -g pm2

Instance details | EC2 | us-east-1 X EC2 Instance Connect | us-east-1 X

```
root@ip-172-31-89-56:~/Dating-App-node.js# sudo npm install -g pm2
pm2 start index.js
added 138 packages, and audited 139 packages in 7s

13 packages are looking for funding
  run 'npm fund' for details

found 0 vulnerabilities
-----  

Runtime Edition  

PM2 is a Production Process Manager for Node.js applications  

with a built-in Load Balancer.
```

i-04d999aa9c4140e12 (nodejs-deployment)  
PublicIPs: 44.210.118.25 PrivateIPs: 172.31.89.56



Instance details | EC2 | us-east-1 X EC2 Instance Connect | us-east-1 X

```
$ pm2 start app.js
Load Balance 4 instances of api.js:
$ pm2 start api.js -i 4
Monitor in production:
$ pm2 monitor
Make pm2 auto-boot at server restart:
$ pm2 startup
To go further checkout:
http://pm2.io/
```

[PM2] Spawning PM2 daemon with pm2\_home=/root/.pm2
[PM2] PM2 Successfully daemonized
[PM2] Starting /root/Dating-App-node.js/index.js in fork\_mode (1 instance)
[PM2] Done.

<b>id</b>	<b>name</b>	<b>namespace</b>	<b>version</b>	<b>mode</b>	<b>pid</b>	<b>uptime</b>	<b>o</b>	<b>status</b>	<b>cpu</b>	<b>mem</b>	<b>user</b>	<b>watching</b>
0	index	default	1.0.0	fork	2718	0s	0	online	0%	32.5mb	root	disabled

root@ip-172-31-89-56:~/Dating-App-node.js# 

i-04d999aa9c4140e12 (nodejs-deployment)  
PublicIPs: 44.210.118.25 PrivateIPs: 172.31.89.56



SecurityGroup | EC2 | us-east-1 | EC2 Instance Connect | us-east-1 | Problem loading page

```
(
  "name": "ray-seas",
  "version": "1.0.0",
  "main": "index.js",
  "scripts": {
    "start": "node index.js",
    "test": "echo \\\"Error: no test specified\\\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "dependencies": {
    "bootstrap": "^5.3.1",
    "express": "^4.18.2"
  },
  "description": ""
)
-- INSERT --

```

i-04d999aa9c4140e12 (nodejs-deployment)  
PublicIPs: 44.210.118.25 PrivateIPs: 172.31.89.56



CloudShell Feedback

SecurityGroup | EC2 | us-east-1 | EC2 Instance Connect | us-east-1 | Problem loading page

```
const express = require('express');
const app = express();
const path = require('path');

// Define a static route to serve static files (like index.html)
app.use(express.static(path.join(__dirname, '/')));

// Start the server
const port = 3000;
app.listen(port, () => {
  console.log(`Server is running on http://localhost:${port}`);
})
-- INSERT --

```

i-04d999aa9c4140e12 (nodejs-deployment)  
PublicIPs: 44.210.118.25 PrivateIPs: 172.31.89.56



Copy instance public ip and paste on google :3000, it will open like this.

